The new Basel Capital Accord (Basel II)

Credit institutions play a particular role in modern economies. They are not only mediators between borrowers and depositors, but also provide a wide range of off-balance-sheet financial services. The professional handling of credit, market, liquidity and other risks is one of the most important services provided by financial intermediaries. Such risks must not lead to instabilities in the financial sector, however. For that reason, special supervisory regulations have been created, which go beyond the institutions' own risk provisioning. Among these regulations, the regulations on capital assume a prominent role.

Given globalised financial markets, there is no alternative to internationally coordinated regulations. Following an initial consultative paper of June 1999, the Basel Committee presented proposals on the revised version of the 1988 Basel Capital Accord in January of this year. Essentially, these proposals concern making the capital requirements for banks more strongly dependent than hitherto on the economic risk as well as taking into account recent developments in the financial markets and in the institutions' risk management. Requirements for qualitative supervision, which involve supervisors having intensive contacts with the banks, and more extensive disclosure obligations are supplementary elements.

The road from Basel I to Basel II

International harmonisation of capital standards

The 1988 Capital Accord of the Basel Committee of Banking Supervision (hereafter referred to as the Basel Committee) represents a milestone in the international harmonisation of supervisory capital regulations.[1] With this agreement (Basel Accord),[2] the minimum capital requirement was fixed at 8 % of the standard risk-weighted credit positions of a bank, with the thus measured capital implicitly also being intended to cover other risks not included in this calculation.

Although the Basel Accord was initially directed only at internationally operating banks, it has now become the globally recognised capital standard for banks and is applied in more than 100 countries. The relevant directives at the EU level, too, have been crucially influenced by the Basel Accord. For that reason, the Basel Capital Accord also forms the basis of the corresponding German supervisory regulations (Principle I pursuant to sections 10 and 10a of the Banking Act).

Inclusion of market price risks

In view of the growing importance of banks' trading activities, banks' market price risks (price risks in the trading book, foreign exchange risks, commodities risks) were incorporated into the capital requirements in 1996.[3] Since then, the banks have also been able to use their internal models in order to manage the market risk for the regulatory calculation of capital adequacy, provided that these models are recognised by the banking supervisory authorities.

Criticism of the present capital adequacy standard

The 1988 Basel Accord has come under increasing criticism over the past few years. This is due to the fact that the institutions' economic risks are captured only very roughly – and thus imprecisely – by the prudentially specified standardised calculation of the credit risks. New financial instruments and methods of credit risk management, such as credit derivatives, netting agreements for balance-sheet positions, the global use of collateral, the securitisation of assets and credit risk models have been virtually ignored up to now. Apart from this, the gearing of the capital requirements solely to credit and market price risks does not correspond to the actual overall risk profile of a bank. By revising the Accord, the Basel Committee has set itself the objective of eliminating, as far as possible, the cited shortcomings of prudential credit risk measurement and of bringing the measurement of credit risks in the capital adequacy regulations more closely into line with the banks' risk management methods. This means that the development initiated in 1996 by the recognition of internal models for market risks is being continued.

1 The Basel Committee on Banking Supervision was established by the central bank governors of the Group of Ten (G-10) countries in 1975. It consists of senior representatives of central banks and bank supervisory authorities from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States. It usually meets every three months at the Bank for International Settlements (BIS) in Basel, where its permanent secretariat is also located.
2 International Convergence of Capital Measurement and Capital Standards, Basel Committee on Banking Supervision (July 1988).
3 Amendment to the Capital Accord to Incorporate Market Risks, Basel Committee on Banking Supervision (January 1996).

The three pillars of the new Basel Accord

Capital base not enough on its own

A risk-appropriate capital base – as important as it is – cannot, on its own, ensure the solvency of a bank and the stability of the banking system. In the final analysis, what is crucial is a bank's risk and profit profile, which is determined by the management, in conjunction with the bank's ability to manage risks and sustain them over the long term. The Basel Committee therefore wishes to encourage further improvement in the banks' internal risk management systems and the monitoring of these systems by the responsible supervisory bodies. In Germany and many other countries, where regulatory activity has, up to now, been characterised mainly by the analysis of banks' reports and of the external auditors' audit reports, this new element will effect a paradigm shift towards banking supervision that is more strongly quality-oriented. Furthermore, more extensive disclosure obligations for banks are envisaged so that the disciplining forces of the markets can be used as a complement to the regulatory requirements.

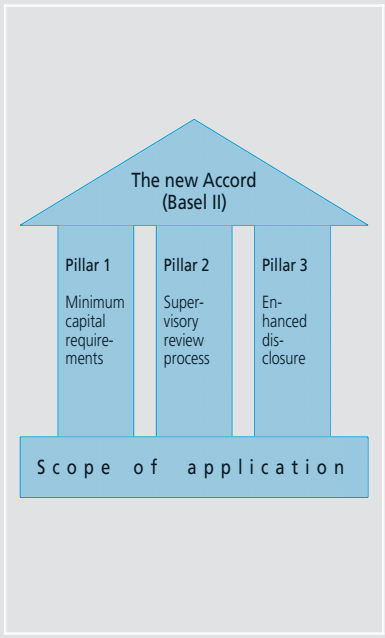
The new Basel Capital Accord therefore consists of three mutually reinforcing pillars affording better protection to the stability of the national and international banking systems.

Pillar 1: Minimum capital requirements

Calculating the capital ratio

Compliance with the capital requirement of Basel II is measured, as before, using the "capital ratio" which must be no lower than 8 %.

The three pillars of the new Basel Accord



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$$\frac{\text{Capital}}{\text{total risk-weighted assets credit risk + (capital charges market risk + operational risk) x 12.5}} \geq 8\%$$

While no changes are currently planned with regard to the definition of the term "capital" and the minimum capital ratio of 8 % has also remained unchanged, the "operational risk" has now been added to the existing risk types "credit risk" and "market risk". In future, the operational risk is to be explicitly covered by capital.

The calculation of the minimum capital requirements is geared to an average analysis with regard to the distribution of risk in the banking sector and, therefore, does not reflect the specific circumstances of individual institutions in every case. The credit institu-

tions are thus expected to maintain own funds over and above compliance with the minimum capital requirements if this is called for by their specific risk situation.

Evolutionary approaches to calculating the capital requirements

The new regulatory capital requirements are not only to be adapted to market developments but should also take account of the varying stages of development in risk management at individual banks. As part of an evolutionary approach, standardised methods of risk measurement and refined methods are envisaged in each case. The transition to the regulatory use of more precise methods is to be "rewarded" by a moderate relaxation of the capital requirements. This means that the banks have an incentive to continue developing their methods of internal management within the various risk categories.

Credit risks

For measuring the capital requirement for credit risk, the Basel Committee proposes a standardised approach as well as an "internal ratings based approach" (IRB) based on a bank's internal ratings of risk.

Standardised approach

In the standardised approach, risk weights are specified, as before, for certain types of claims. In addition to the familiar weights (0 %, 20 %, 50 % and 100 %), a new weighting factor of 150 % has been introduced for borrowers with a poor rating. In the standardised approach, the risk weighting in the individual risk groups (mainly "banks", "non-banks" and "sovereigns") will in future substantially depend on assessments by external credit assessment institutions (above all, rating agencies and also, in the case of sovereigns, on the export credit agencies of the OECD) (see table on page 20). The Basel Committee is aware that the ratings applied by the rating agencies and other institutions vary worldwide. For that reason, further work is being undertaken, with one of the aims being to define ranges of probability of default (PD) as a basis of allocation to one of the weighting categories. These probabilities of default must also be consistent with the requirements pertaining to banks' internal ratings.

Claims on sovereigns

Claims on sovereigns are weighted, depending on their rating, at between 0 % and 150 %. For claims on central government in Germany, the 0 % weighting continues to apply under the modified standardised approach as well.

Claims on non-central government public sector entities

Claims on non-central government public sector entities (PSEs) are weighted in the same way as claims on banks. Subject to national discretion, however, claims on domestic PSEs may also be treated as claims on the sovereigns in whose jurisdictions the PSEs are established . This means that the risk assessment applied hitherto in Germany can be retained, i. e. not only the Federal government, but also the Federal states *(Länder)*, legally dependent special funds of the Federal government or a state as well as local authorities and local authority associations are given a 0 % weighting.

Claims on multilateral development banks

Highly rated development banks are to benefit in future from a 0 % weighting if they also fulfil specific criteria established by the Basel

Committee with regard to their shareholder structure, their shareholders' continued capital contributions as well as their level of capital and lending policy.

Claims on banks

The consultative paper provides two options for claims on banks. The national supervisors are to decide which option will be applied to all banks in their jurisdiction. Under the first option, banks are assigned a risk weight one category less favourable than that assigned to claims on the sovereign of incorporation. The second option bases a bank's risk weighting on its external rating. Furthermore, short-term claims (with a maturity of three months or less) are to be assigned a preferential risk weight within certain limits.[4]

Retaining the possibility of deriving the credit rating of banks from the sovereign of incorporation (option 1) is a welcome outcome from both a national and an EU perspective, since this means that the existing rating gap in the case of small and medium-sized banks does not have an adverse impact on their refinancing.

Claims on securities firms are to be treated in accordance with the same rules as those envisaged for banks, provided that the securities firms are subject to comparable supervisory and regulatory arrangements with the same capital requirements.

Claims on corporates

Claims on corporates (including insurance companies) are to be weighted in future depending on their external risk rating. For this purpose, three new risk weight categories are being introduced for corporates (20 %, 50 %, 150 %). As before, claims on unrated corporates are to be given a risk weight of 100 %.

Claims secured by real estate

Claims secured by mortgages on residential property that is or will be occupied by the borrower, or that is rented, need to be risk weighted at only 50 % in future as well. In the case of claims secured on commercial real estate, the Basel Committee is adhering to its fundamentally cautious assessment (100 % weighting), but a reduced weighting of 50 % is also possible if certain conditions are fulfilled.[5]

New risk category with 150 % weighting

A 150 % risk weight category has been newly introduced not only for claims with a poor external rating but also for claims for which delays in payment have occurred. In particular, the unsecured portions of claims of any asset, net of specific provisions, that is past due for more than 90 days is to be risk weighted at 150 %.

External credit assessments

The decision on whether an external credit assessment institution (rating agency) is recognised as being suitable for assigning regulatory risk weights is taken by the national supervisors. Specifically, in order to be recognised, the rating agency in question must satisfy the criteria set out in the table on page 21. These criteria give rise to a number of issues concerning their im-

4 Additionally, for both options lower risk weights apply to lending and refinancing in the domestic currency (local funding) if the original maturity is three months or less.

5 These conditions include, in particular, providing evidence over a period of at least ten years that, on a national average (i) losses stemming from commercial real estate lending up to the lower of 50 % of the market value or 60 % of loan-to-value (LTV) based on mortgage-lending-value (MLV) must not exceed 0.3 % of the outstanding loans in any given year, and that (ii) overall losses stemming from commercial real estate lending must not exceed 0.5 % of the outstanding loans in any given year.

Credit assessments and risk weights in the standardised approach *

Ratings	Risk weight in %				
	Sovereigns	Banks Option 1	Banks Option 2	Non-banks	ABS 1
AAA to AA–	0	20	20	20	20
A+ to A–	20	50	50	50	50
BBB+ to BBB–	50	100		100	100
BB+ to BB–	100		100		150
B+ to B–				150	1,250
below B–	150	150	150		1,250
unrated	100	100	50	100	1,250

* The notations follow the methodology used by one institution, Standards & Poor's. The ratings of other external credit assessment agencies could equally be used. — 1 Asset-backed securities.

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plementation in practice. In particular, the data that have to be submitted for an assessment of the forecast quality still have to be determined, as does the procedure to be applied if the number of credit assessments undertaken by a rating institution in the case of individual groups of borrowers is not large enough to be able to validate the rating.

Asset-backed securities

Introduction of harmonised regulations for asset backed securities

The new Basel Capital Accord introduces internationally harmonised regulations on the supervisory treatment of asset-backed securities (ABS). The fact that the prudentially measured credit risk has differed hitherto from the actual credit risk, especially when taking portfolio effects into account, has in part led market players to develop securitisation techniques as a method of optimising their internal capital management. The outcome of this is that ABS transactions have often resulted in a significant lowering of the regulatory capital requirements without a corresponding reduction in the bank's credit risk in all cases (regulatory capital arbitrage).

A fundamental distinction has to be made between two types of asset-backed securities transactions:

Traditional securitisation

A traditional ABS involves a given asset of a credit institution (originator) being sold to a third party which has been set up solely for this purpose (known as a "special purpose vehicle" or SPV). The SPV refinances itself by issuing securities, the redemption of which is linked to the servicing of the acquired asset.

Synthetic securisation

In what are known as synthetic structures, however, the asset is not sold by the originator. Instead, the credit risk contained in the asset is transferred through the use of credit derivatives, thus constituting a synthetic counter-position (hedge). Synthetic transactions have the advantage that they do not require a transfer or assignment of the assets and thus achieve a greater flexibility and additional cost advantages.

Capital requirements for investors

The future capital requirements for banks as investors, i. e. buyers of ABS tranches, will be determined in the standard approach by the external assessment of such paper (see table on page 20).

Capital requirements for the originator

What is crucial for the minimum capital requirements in the case of the originating bank is whether – and to what extent – the credit risk has been transferred as a result of the securitisation structure. Firstly, the explicit risks are to be taken into account and weighted as risk assets which the bank assumes, say, by retaining individual tranches of ABS or by providing lines of liquidity. Furthermore, there may also be implicit risks for the bank after securitisation in the form of non-contractual recourse. For example, in order to protect its reputation, a bank may counter a deterioration of the underlying assets by exchanging the claims that are subject to payment difficulties for more valuable assets. The debate in the Basel Committee on the extent to which capital requirements should be used also to take account of these implicit risks has not yet been concluded.

Eligibility criteria for the recognition of a rating agency

A rating agency must satisfy the following conditions:

- its assessment procedures should adhere to objective criteria based on historical experience and be subject to ongoing review;
- its rating should be independent of political or economic influences;
- the methodology it uses should be publicly accessible and the individual assessments should be available to both domestic and foreign institutions;
- it should have sufficient resources to carry out high-quality credit assessments. These resources should allow for substantial ongoing contact with senior and operational levels of the entities assessed;
- its credit assessments should be regarded as credible.

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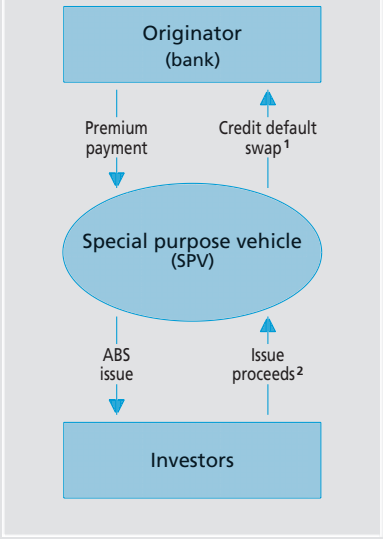
Risk mitigation techniques

Credit risk mitigation geared more than before to banking practice

To a greater extent than before, banking supervisors will in future recognise the instruments that are used in banking practice for securing loans – collateral, guarantees, credit derivatives and netting agreements for balance-sheet positions (on-balance-sheet netting). The main difference between collateral, on the one hand, and guarantees and credit derivatives, on the other, is that, in the case of collateral, the lending bank receives an asset[6] that it can utilise in the event of the borrower defaulting. By contrast, the risk reduction in the case of guaran-

6 Under Basel II, eligible collateral consists of cash on deposit with the lending bank, securities issued by sovereigns and other public sector entities, banks, securities firms and corporates as well as securities, investment fund certificates and gold. Certain restrictions apply to some of the above collateral instruments.

Synthetic ABS transactions



1 Payments arising from the credit default swap are made only if a credit event occurs. — **2** Issue proceeds are used for hedging the credit default swap.

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tees or credit derivatives is based on the promise to pay of the guarantor or the protection provider.

Collateral "haircuts" against fluctuations in value

The value of collateral changes over time. Supervisory "haircuts" of the value of the posted collateral are designed to protect against such price volatility. The past fluctuations in the value of the category of collateral in question, taking into account its residual maturity, are the basis for determining the haircuts. The frequency with which the collateral is valued and the possibility of demanding variation margins are also taken into consideration. Institutions which possess a market risk model recognised by the supervisors may determine the haircuts themselves using their market risk model.

w factor

Irrespective of potential decreases in the value of the collateral, there may also, for example, be weaknesses in the contractual terms or with regard to an immediate utilisation of the collateral. For that reason, the factor applied to the collateralised portion of the exposure is generally 15 % of the risk weight of the original borrower (w factor), although this factor may be dispensed with if certain types of collateral are provided. In the case of short-term repo and securities lending/securities borrowing transactions with domestic government securities, for example, a 100 % collateralisation is recognised if such transactions are subject to certain conditions, including daily remargining. Short-term money market operations via securities lending and borrowing transactions are thereby given special treatment.

Guarantees and credit derivatives

In the case of guarantees and credit derivatives, the risk weight of the protection provider is assigned, as before, to the collateralised exposure (substitution approach).[7] The inclusion of the w factor is new here, too.

Maturity mismatch

Finally, the possibilities of recognising collateralisation techniques are being enhanced by a risk mitigation applying in future even if the hedge does not run until the end of the contractually agreed exposure, i. e. there is a maturity mismatch between the loan and hedging instrument. The extent to which the mitigation of risk is recognised depends on the length of

7 In order to enable the new Basel Accord to take into account a type of collateral that is often used in banking practice in Germany, life insurance contracts (given an open assignment) will be recognised in future as a "guarantee" of the life insurance company, i. e. assigned the risk weight of the insurance company.

the collateralised period in relation to the residual maturity. Nevertheless, in the case of maturity mismatches, hedges having at least one year of residual maturity are required.

The envisaged method of determining the eligible value of a hedge and of taking into account guarantees and credit derivatives is explained using some examples in the annex on page 34 ff.

Internal ratings based (IRB) approach

Banks' best practices as a basis

The authorisation of internal rating for purposes of calculating regulatory capital builds on the banks' tried-and-tested credit management techniques and continues the course set out by the supervisory recognition of market risk models in making increased use of banks' own methods of management and risk measurement for calculating regulatory capital. At the same time, the way is to be prepared for the supervisory recognition of credit risk models representing a further development of the internal rating methods.

The IRB approach in the new accord is divided into three elements:

– the relevant risk components

– the calculation of the risk-weighted assets

– the minimum requirements which the banks have to fulfil if they wish to qualify for the IRB approach.

Six risk asset classes

Under the IRB approach, the capital requirements are calculated by reference to six classes of assets: corporates, banks, sovereigns, retail, project finance and equity.

A similar treatment is envisaged for corporate, bank and sovereign exposures. Further work is needed in the area of retail exposure and, in particular, project finance. Within the IRB approach, a simpler method of calculating the credit risk arising from retail portfolios is to be made possible. This is intended to make it easier – especially for smaller banks – to start using internal ratings for the calculation of regulatory capital. Given the broad dispersion of risk in such portfolios, a lower capital requirement than in the case of the other loan portfolios is envisaged (see chart on page 25). Smaller corporates and self-employed persons are also likely to benefit from this as such loans are, under certain conditions, assigned to the retail portfolio.

Standard supervisory haircuts *

Figures in %

Collateral		Sovereigns 1	Banks/ corporates 2
Issue rating for debt securities, by residual maturity			
AAA/AA	≤ 1 year	0.5	1
	> 1 year, ≤ 5 years	2	4
	> 5 years	4	8
A/BBB	≤ 1 year	1	2
	> 1 year, ≤ 5 years	3	6
	> 5 years	6	12
BB	≤ 1 year	20	
	> 1 year, ≤ 5 years	20	
	> 5 years	20	
Main index equities		20	
Other equities listed on a recognised exchange		30	
Cash		0	
Gold		15	
Surcharge for foreign exchange risk		8	

* Assuming daily mark-to-market and remargining. — **1** Includes PSEs which are treated as sovereigns by the national supervisor. — **2** Includes PSEs which are **not** treated as sovereigns by the national supervisor.

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Two IRB approaches

In order to enable as large a number of banks as possible to have access to the IRB approach, the new Basel regulations provide for two alternative IRB approaches: the simpler "foundation approach" and the "advanced approach", the latter being based on a broader use of banks' own internal assessments of risk components. The Basel Committee expects that only a small number of banks worldwide will be able to apply the advanced approach immediately when the new regulations come into force (2004).

Risk components of exposures to corporates, banks and sovereigns

The risk components of exposures to corporates, banks and sovereigns contained in the IRB approach are based on the accepted practice of credit risk measurement and credit management. First of all, the financial standing of the borrower is assessed by assignment to an internal rating grade. In the next stage, the probability of default (PD) is estimated for the time horizon of one year for each internal rating grade. If the borrower defaults, the potential loss is dependent on other risk parameters. If the proceeds from the payments made by the borrower and from the utilisation of the collateral and guarantees are insufficient to cover the bank's exposure, this implies an actual loss, the expected value of which is the expected loss at the time of the default, which is termed "loss given default" (LGD). This variable is usually expressed as a percentage of the expected exposure to the borrower at the time of default, known as "exposure at default" (EAD). Furthermore, the residual maturity of a loan, called the "effective maturity" (M), also plays a role as a risk component in the IRB approach.

Reference definition of default

The definition of default has key importance in estimating the risk components – in particular, the probability of default – and thus the amount of regulatory capital required. In practice, various credit events are used for this purpose. In order to create comparable competitive conditions internationally, the Basel Committee has proposed a reference definition of default (see overview on page 26).[8]

Foundation IRB approach

In order to facilitate a widespread application of internal rating and to make it easier for banks to introduce more complex methods of measurement, the foundation IRB approach envisages that, of the quantitative risk components, the banks estimate only the probabilities of default of the rating grades in the individual risk asset categories. The other risk components (M, LGD, EAD) are specified by the supervisors.[9] Collateral, guarantees, credit derivatives and netting agreements are, in effect, taken into account in a way similar to that of the standardised approach.

Advanced IRB approach

The advanced IRB approach offers the banks the possibility of using internally estimated parameters for all the cited risk components except the residual maturity. Moreover, the group of eligible collateral is not restricted and due account may be taken of the LGD on the basis of the bank's historical and empirical

8 An analogous definition of default applies to retail exposures, albeit with the following modification: the term "restructuring" covers, in particular, any prolongation of an exposure (such as extending the loan maturity in order to reduce repayment instalments).
9 The residual maturity is assumed to be three years on average. The supervisory LGD values are 50 % for senior claims and 75 % for subordinated claims. The EAD is determined by the current utilisation plus 75 % of the undrawn credit line.

information on loss rates. With the exception of off-balance-sheet positions, the EAD, too, may be determined by the individual bank. However, the banks have to adhere to extended qualitative minimum requirements for these additional estimations.

In the advanced IRB approach, two alternatives are under discussion for taking the residual maturity of a loan into consideration. These two approaches result in differing adjustment factors. The inclusion of the maturity as a determinant of the credit risk must not lead to long-term credit operations having to be made subject to capital requirements that are too high and consequently being placed under a strain. The long-term financial relationships in the German banking system have not only been a factor that has increased the stability of the financial system. They have also encouraged overall economic growth and employment.

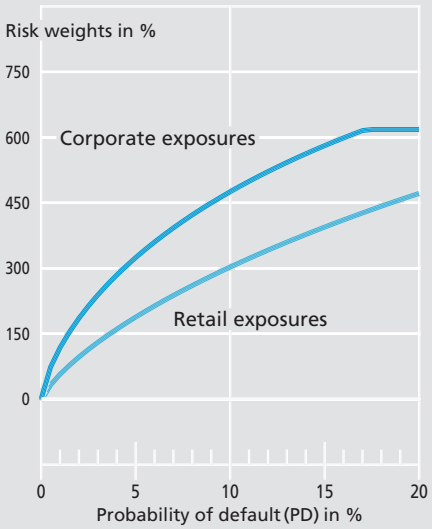
Granularity

In addition to the capital requirement based on the individual exposures, the capital requirement is adjusted depending on the granularity[10] of the loan portfolio. A concentration of single borrowers or groups of closely related borrowers (large exposures) is regarded as a significant risk factor and thus increases the overall capital requirement. High granularity, by contrast, implies a smaller capital requirement.

Minimum requirements

Banks which intend to use the IRB approach for calculating supervisory capital must, first of all, satisfy general minimum requirements for the authorisation of internal rating procedures. These requirements are designed to ensure that the rating system, the rating process and the estimated risk components of a bank are adequate.

Comparison of risk weights for retail exposures and corporate exposures *



* The risk weight function for retail exposures assumes higher granularity and diversification for retail portfolios than for corporate portfolios.

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Among the minimum requirements, particular emphasis should be placed on the requirements pertaining to the application of internal rating methods and internal validation. Both criteria are intended to ensure that the rating systems used for calculating regulatory capital are employed not just for regulatory purposes but also actually for the banks' internal risk management. The rating grades assigned to the individual borrowers and the quantitative information derived from them must be an integral part of risk measurement

10 Granularity denotes a unit of measurement for the number and size of the individual claims in relation to the overall volume of the portfolio.

Reference definition of default for the application of the IRB approach *

The obligor is unlikely to pay its debt obligations (principal, interest, or fees) in full.

A credit event associated with any obligation of the obligor, such as charge-off, specific provision, or distressed restructuring involving the forgiveness or postponement of principal, interest, or fees.

The obligor is past due more than 90 days on any credit obligation.

The obligor has filed for bankruptcy or similar protection from creditors.

* An obligor is considered to have defaulted when one or more of the cited criteria is fulfilled.

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and risk management and be taken into consideration in the pricing of loans and risk provisioning. Furthermore, in conformity with the requirements of the second pillar of the consultative paper, internal ratings have to be incorporated into the internal assessment of capital adequacy. This does not necessarily require the use of a credit risk model. Nevertheless, for assessing capital adequacy, the banks are required additionally to have in place sound stress testing processes in order to assess potential crisis scenarios.

Partial use of the IRB approach

For the credit institutions, there exists the possibility of applying the IRB approach initially to only some of the risk assets. Such partial use of the IRB approach must be only for a limited period, however. The bank has to adopt the IRB approach for all risk assets and business units within an appropriately short period of time. This is necessary on grounds of risk management and for preventing institutions applying the most capital-favourable alternative in each case. To this end, a cogent strategy and a time schedule for the integral use of the IRB approach are to be agreed with the supervisors. Excepted from this are risk assets in business units which, owing to their size and risk profile, are comparatively insignificant.

Transitional arrangements

Following the implementation of the new Capital Accord in 2004, there will be a transitional period of three years. At the start of this period, banks have to submit no more than two years of historical data for their internal assessment of the probability of default rather than data for five years as actually called for in the minimum requirements. This requirement will increase every year, so that five years of historical data have to be presented in 2007.

For a period of two years after the implementation of the regulations, banks opting immediately for the advanced IRB approach will have to perform parallel calculations for the capital requirements on the basis of both the foundation and advanced IRB approach. During this period, as specified by the Basel Committee, the capital requirements for the advanced approach should not fall below 90 % of the capital requirement under the foundation approach. For parallel calculation, the Basel Committee intends to present simplified calculation procedures under the foundation approach.

Operational risk

Definition of operational risk

Operational risk is defined as "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events".[11]

Reasons for a capital requirement

Operational risks, which were hitherto included only implicitly in the Capital Accord, have become increasingly important over the past few years. The main reason for this – besides the fact that banking operations are becoming more and more dependent on IT, the related trend towards more outsourcing and the spread of electronic banking – is the fundamentally greater complexity of business operations which is being intensified by the ongoing process of concentration in the banking industry. Banks class operational risk as the second most important category of risk after credit risk and allocate roughly one-fifth of their own economic capital for this purpose. Nevertheless, the management mechanisms, especially methods of defining and quantifying operational risk, are still at an early stage of development; so far no standard on this has emerged.

Three methodologies for measuring risk

Not least in view of the wide range of different methods used in practice, the Basel Committee on Banking Supervision – following extensive consultation with the banking industry – has specified three methodologies for measuring the operational risks: the basic indicator approach, the standardised approach and the internal measurement approach. This range of approaches, which represents a 'continuum' characterised by increasing risk sensitivity and sophistication accompanied by a simultaneous reduction in capital charges, gives the banks the freedom – and is intended to encourage them – to switch to more sophisticated risk management techniques.

Basic indicator approach

The basic indicator approach is a less sophisticated procedure which is applicable to any bank but which does not involve a genuine measurement of risk. The capital charge is determined using an indicator – for example, gross income.[12] Since this method involves only a generalised estimate of the operational

Overview of minimum requirements for using the IRB approach

Meaningful differentiation of the credit risk by rating grade
Completeness and integrity of the rating assignments
Oversight over the rating system and processes
Criteria and orientation of the rating system
Estimation of the probability of default
Data collection and IT systems
Internal validation
Disclosure requirements
Minimum requirements for supervisory estimates of LGD and EAD
Additional minimum requirements for the advanced IRB approach: – Minimum requirements for the use of own LGD estimates – Minimum requirements for the use of own EAD estimates – Minimum requirements for the assessment of guarantors and sellers of credit derivatives

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11 Provisional definition by the Basel Committee on Banking Supervision.
12 Provisional definition of gross income = net interest income + net non-interest income (comprising fees and commissions receivable less fees and commissions payable, the net result on financial operations and other income. This excludes extraordinary or irregular items. Income is to be stated before deduction of operational losses).

risk, the banking supervisors expect internationally active banks and credit institutions with a significant operational risk to use more precise methodologies, i. e. at least the standardised approach.

Standardised approach

In the standardised approach, the operational risk is measured using an indicator that reflects the volume of the bank's activities within each business line, such as retail banking or payment and settlement. The operational risk is then weighted by a capital factor specified by the supervisors. The Basel Committee is aware that this approach, too, represents only a rough measurement of risk, since it is not based on any loss data specific to the institution. The supervisors therefore advocate that banks switch from the standardised approach to the internal measurement approach. In order to create incentives to do so, banks – in addition to enjoying lower capital charges – are to be given the option of applying the internal measurement approach only to some lines of business (partial use) to begin with.

Internal measurement approach

The internal measurement approach is the most sophisticated approach and also takes account of the institutions' individual experience of operational losses. Under this approach, the operational risk is measured by business lines and types of loss (e. g. write-offs, legal costs). Consequently, a distinction is made not only by line of business but also by the type of operational loss in each business area. The banks determine the scale of the expected operational loss by each type of loss and business line on the basis of internal loss data (supplemented, to the necessary extent, by external loss data). The overall capital requirement is then calculated by multiplying these expected losses by a capital factor specified by the supervisors.

Further developments

In addition to the approaches outlined in the consultative paper, a fourth method, known as the "loss distribution approach", is currently under discussion. Under this approach, the banks may, under certain circumstances, determine the operational risk using their internal models. The supervisory assessment of risk mitigation techniques, such as insurance against operational risk, is also being studied at present.

Since the supervisors, too, are venturing into new territory in terms of setting capital requirements to cover operational risk, further consultation with the banking industry and, in particular, the systematic construction of relevant databases are of paramount importance. Establishing qualitative standards which have to be met in order to use the advanced approaches will also be a focal point of future work.

Specification of the overall capital by calibration of the risk weights

Calibration of great political importance

The question of calibrating risk weights is of crucial importance with regard to safeguarding the stability of the financial system and an international level playing field. This concerns the "correct" level of own capital to be maintained by the banks as well as the relative weighting of the individual risks and – in the area of credit risk – the upward slope of the risk weights' curve.

Top-down approach

In the view of the Basel Committee, the average level of provisioning with own funds for capital adequacy purposes by banks in the G-10 countries should essentially remain unchanged. Depending on the individual risk situation, this will lead to a raising of the capital requirements for some banks and a lowering of them in the case of others. When calibrating the risk weights under the internal ratings based approach, it should be taken into account that the new Capital Accord provides for an explicit capital charge for operational risks which were hitherto implicitly covered by other items. Initial studies, based on the credit institutions' data, show that the ratio of credit risk to operational risk in the banking sector is roughly 4:1. In order to achieve the objective of an unchanged average minimum capital requirement of 8 % (relative to the existing standardised risk-weighted credit positions of a bank), the credit risk and the operational risk are calibrated, using a top-down approach, at 6.4 % and 1.6 %, respectively.

Representative average portfolio

The calculation of a representative "average portfolio" plays a key role in calibrating the risk weights under the IRB approach. This average portfolio is designed to reflect, firstly, the weighting of the various risk asset classes under the IRB approach and, secondly, the way in which the risk assets are distributed among the various rating grades. The envisaged 6.4 % calibration for the credit risk relates to the weighted mean of all portfolio classes under the IRB approach. In some classes (corporates, for example), this may lead to a higher weighting than the average 6.4 %. In other classes (such as retail), it may result in a lower weighting. In the calibration, due account also has to be taken of greater recognition being given to the effects of credit risk mitigation techniques. The annex provides an explanation of the method of determining the benchmark risk weights for corporates under the foundation approach as a function of the borrower's probability of default.

Quantitative Impact Study

The calibration of the risk weights is closely connected with the "Quantitative Impact Study" which is currently being conducted by the Basel Committee. The aim of this study is, firstly, to investigate what impact the new Capital Accord will have on the regulatory capital ratios of the banks and, secondly, to collect the data needed for calibrating the risk weights under the IRB approach and for the operational risk. The distribution of the risk assets among the various rating grades plays a key role in this context.

Pillar 2: Supervisory Review Process (SRP)

Supervisory Review Process

The "Supervisory Review Process" represents a major innovation in the revision of the 1988 Basel Capital Accord. Within the "second pillar", which is an integral part of the new Capital Accord having equal status alongside the minimum capital requirements and the promotion of market transparency, particular emphasis is placed on the need for qualitative banking supervision.

Objectives

The main aims of the supervisory review process may be summarised as follows:

The banks are to be encouraged to make continuous improvements to their internal procedures for assessing their institution-specific risk profile and capital adequacy. This applies equally to the continual adaptation and development of new risk management methods and internal controls.

The supervisory review process is designed to capture external factors, such as the influence of the business cycle, as well as risk areas which have not – or not completely – been taken into consideration when calculating the minimum capital requirements (e.g. interest rate risks in the banking book or uncertainties in measuring operational risks).

The supervisory review approach will promote the dialogue between banks and supervisors, since the institutions' own procedures will become the yardstick of supervisory assessment to a much greater extent than in the past. Finally, the supervisors will assess the banks' ability to identify, measure, manage and monitor their risk exposures.

Supervisors are to have the ability to take action requiring banks to hold capital in excess of the minimum capital requirements up to a level that is indicated as necessary by an assessment of the institution as a whole. The action to be taken in each case, such as stricter monitoring of the bank or requiring higher regulatory capital ratios, is left to the discretion of the supervisory authority.

Challenges for banking supervisors

The supervisory review process represents a major challenge to German banking supervisors. To a much greater extent than before, supervisors are required to be "close" to the banks so that they can identify risks at an early stage and initiate any regulatory measures that are needed. Not least, the question of obtaining the quantity and quality of resources which the banking supervisors need for conducting the monitoring process will play a major role in the implementation of Basel II. In an international context, greater harmonisation will be absolutely crucial – not only in major regulations, such as the capital requirements for banks, but also in supervisory practices – so that a level playing field exists for the banks in different countries.

Pillar 3: Enhanced disclosure

Aims of enhanced transparency

The provisions on the minimum capital requirements (pillar 1) and the supervisory review process (pillar 2) are joined by transparency requirements (pillar 3), which are designed to allow a complementary use of market mechanisms for regulatory objectives. This is based on the expectation that well informed market players will reward credit institutions' risk-aware business management and effective risk management in their investment and credit decisions and/or penalise riskier behaviour. This provides credit institutions with an additional incentive to control and efficiently manage their risks.

Scope and frequency of disclosure

A flexible strategy has been developed for achieving market discipline of this kind and for taking due account of the interests of the credit institutions and the market players. In terms of the scope and frequency of disclos-

ure, for example, the principles of materiality and protection of confidential information can be taken into consideration when determining a bank's individual disclosure practice. Whereas, generally, disclosure should be made on a semi-annual basis, credit institutions that operate only in a particular region or particular area of business and have a stable risk profile may, for example, report annually. Also, the distinction between core and supplementary disclosures allows reporting which is consistent with the bank's own risk profile. Only major internationally active banks are expected to provide the full range of disclosure.

Disclosure recommendations and requirements

The proposals on disclosure are generally framed as recommendations, since supervisors are often not the competent authority for issuing accounting regulations. They have the status of requirements in those cases where disclosure relates to the application of certain internal procedures, such as the use of internal ratings, asset securitisation or the inclusion of collateral in determining the credit risk to be covered by capital. This is because the institution can achieve lower regulatory capital ratios with the above-mentioned procedures. Supervisory recognition of internal methods and instruments that have the effect of lowering the capital ratios depends on compliance with the relevant transparency requirements, thus ensuring that the institution's associated scope for discretion is under a certain degree of public control.

Four areas of disclosure

The transparency provisions relate to four areas: application of capital requirements, structure of capital, risk exposures and capital adequacy.

Scope of application of capital requirements

When applying the capital requirements on a consolidated basis, there should be disclosure of which corporate entities belong to the corporate group and how such participating interests (equity and capital) have been captured when calculating the risk positions and the eligible capital (e. g. consolidation or deduction from capital).

Capital structure

This section of the second consultative paper requires disclosure of the nature and scope of the individual features of capital, and of the overall eligible capital. The key disclosure recommendations relate, in particular, to the core capital and its individual components: an explanation is to be given of the nature and terms of innovative core capital components with regard, say, to maturity, cumulative characteristics, step-up provisions and repayment agreements.

Risk exposures

This disclosure is designed to enable market players to assess a bank's risk positions and risk management and covers four key banking risks: credit risk, market risk, operational risk and interest rate risk in the banking book. The recommended disclosure structure largely adheres to a uniform pattern. The current risk profile as an ex ante risk assessment is compared with the risks that have actually materialised during the reporting period in an ex post analysis in what is known as "back-testing". This is intended to convey an impression of the reliability and quality of the chosen risk management methods.

Capital adequacy

The capital requirements in the individual risk categories and the overall capital ratio are to be disclosed. If a credit institution itself de-

Chronology

July 1988	Publication of the Basel Capital Accord (Basel I)
End-1992	Implementation of Basel I
January 1996	Basel Market Risk Paper
June 1999	First consultative paper on the revision of the Capital Accord (Basel II)
January 2001	Second consultative paper on Basel II
End-May 2001	End of the consultation period
Approx. end-2001	Publication of the new Capital Accord
2004	Implementation of the new Basel Capital Accord

Deutsche Bundesbank

fines an "economic capital" and uses it for internal risk management and/or internal risk mitigation by assigning limits to classes of risk, business lines or business units, disclosure of these figures is desirable, since they can provide information on how regulatory capital compares with economic capital.

Disclosure on the basis of internal and external accounting

In order to keep the institutions' workload to a minimum, the disclosure recommendations generally aim at the publication only of information that can be easily obtained from internal accounting, i. e. data that is prepared in any case for risk management or external accounting purposes. As part of its contacts with the International Accounting Standards Committee (IASC), the Basel Committee is endeavouring to have its disclosure requirements incorporated into the current revision of IAS 30 "Disclosures in the Financial Statements of Banks and Similar Financial Institutions" in order to maintain as large a degree of conformity as possible between the supervisory disclosures and the disclosures forming part of external accounting.

Time schedule, implementation

The consultation period that has been running since the publication of the second consultative paper in mid-January of this year ends in May 2001. As the debate on a number of detailed aspects of the new regulations will, in all probability, not be concluded by the end of May, there will be a close dialogue with the banking industry on the issues that are still unresolved even after the end of the consultation period. At the same time, the institutions' comments on the consultative paper that has been presented can be incorporated as part of an interactive process until the work is finalised. The consultative period therefore does not mark the end of the banks' opportunities of influencing the future Basel regulations.

The information, remarks and comments provided during the consultation are to be incorporated and assimilated within the following few months with the aim of adopting the new Accord before the end of this year. Implementation of Basel II is scheduled for early in 2004.

Revision of the capital adequacy regulations at the EU level; translation into national law

As mentioned at the beginning of this article, the Basel Capital Accord has no formal legislative character, but it does have a crucial influence on the relevant directives at the level of the EU and thus also on German banking supervisory law.

Parallel work at the EU level

At the European level, intensive work on the revision of the capital adequacy regulations is therefore taking place in parallel with the work of the Basel Committee. The European Commission published a consultative paper of its own directly after publication of each of the two Basel consultative papers. The Commission's papers largely follow the example of the Basel proposals but are more closely geared to the banking structure in Europe. In particular, this is intended to ensure that the new regulations can be applied to the large number of small and medium-sized banks in the EU.

European Commission proposes three strands

Mainly on grounds of competition, the European Union is aiming to set the timetable for the legislative process in the EU so that the new capital adequacy regulations, even with due regard to the national implementation process, can likewise enter into force in 2004 as envisaged by the Basel Committee. In order to achieve this ambitious objective, the European Commission has proposed implementation in three "strands".

In the first strand, the major decisions and principles are to be set down in a directive. The European Commission intends to present a first draft of this directive as early as mid-2001. The second strand is to be formed by annexes to the directive, incorporating areas that are still being elaborated or which depend on market developments. Any amendments to the annexes which are required later are to be made through the comitology procedure.[13] Finally, in the third strand a higher degree of convergence is to be achieved in the interpretation of uncertain legal terms and in exercising the powers conferred on the supervisory authorities with the aim of advancing the harmonisation of supervisory practices.

Implementation in Germany

The relevance to competition of a simultaneous implementation of the new capital requirements is perceived in Germany, too. For this reason, the Financial Committee of the Bundestag has already discussed the proposal on several occasions. Furthermore, the Federal Ministry of Finance has started talks with the institutions involved in supervision in order to put in place the framework needed for a timely implementation with the Basel standard.

13 The comitology procedure is based on the third indent of Article 202 of the EU Treaty as revised by the Treaty of Amsterdam, governing the excercise of implementing powers (comitology procedure) in the acts which the Council adopts. This is supplemented by the Council Decision laying down the procedures for the exercise of implementing powers conferred on the Commission. The precondition for the comitology procedure is that all essential elements of the measure to be implemented are cited in a legal instrument (in this context: directive):

Annex

This annex will show how the capital requirements are calculated under the new Basel Capital Accord using the standard approach and the IRB approach. Moreover, it explains how the risk mitigation techniques are taken into account.

Standardised approach

Examples

The capital charge for a loan is calculated, according to the standardised approach, using the table on page 20:

1st example The bank has a government bond in the banking book worth € 1,000 with a BB rating given by a recognised rating agency:
Credit exposure of € 1,000 x risk weight of 100 % x capital ratio of 8 % = capital charge of € 80.

2nd example Loan of € 1,000 to an enterprise, with the enterprise being given an A rating by a recognised rating agency:
loan amount of € 1,000 x risk weight of 50 % x capital ratio of 8 % = capital charge of € 40 for the loan.

3rd example: Loan of € 1,000 to an unrated enterprise:
loan amount of € 1,000 x risk weight of 100 % x capital ratio of 8 % = capital charge of € 80.

4th example Purchase of a corporate bond, with an issue rating of AA, the enterprise having an issuer rating of A:
Loan amount of € 1,000 x risk weight of 20 % x capital ratio of 8 % = capital charge of € 16.

Credit risk mitigation techniques

The principles[14] for the recognition of collateral developed by the Basel Committee are intended to recognise collateral at that value which can always be achieved for utilisation purposes. For this, haircuts are used to calculate the "adjusted value":

$$C_A = \frac{C}{1 + H_E + H_C + H_{FX}}$$

Explanations of the symbols

- C_A adjusted value of the collateral
- C current market value of the collateral received
- H_E haircut to protect against price volatility of the loan
- H_C haircut appropriate for the collateral received
- H_{FX} haircut for currency mismatch

If the value of the exposure exceeds the adjusted value of the collateral ($E > C_A$), the risk-weighted assets are

$$r^* \times E = r \times [E - (1-w) \times C_A]$$

- r^* risk weight of the position taking into account the mitigation of risk by the collateral
- E value of the uncollateralised exposure
- r risk weight of the uncollateralised exposure
- w floor factor applied to the secured portion of the transaction

If the value of the exposure does not exceed the adjusted value of the collateral ($E \leq C_A$), the risk-

14 The principles for recognising collateral instruments apply to both the standardised approach and the IRB approach.

weighted assets are subject to a floor related to the borrower's creditworthiness:

$$r^* \times E = r \times w \times E$$

All haircuts are applied to the current market value C of the collateral received.

The size of the haircut depends on the frequency of revaluation, the type of collateral (including issuer, maturity and rating of the bonds) and the type of transaction (e. g. repos with daily remargining).

Examples

1st example

Loan of € 950 to an unrated enterprise (risk weight of 100 %). Collateral: shares included in a main index and having a current value of € 1,000. No maturity mismatch, but currency mismatch (shares not traded in euro). Collateral is revalued every 90 trading days.

General formula to calculate haircuts (scaled up to 90 days)

$$H = H_{10}\sqrt{\frac{N_{RV} + 19}{10}} = H_{10}\sqrt{\frac{90 + 19}{10}},$$

where H_{10FX} = 8 % and H_{10C} = 20 % (according to table on page 23).

According to the above formula,
H_{90C} = 66.0 % and H_{90FX} = 26.4 %.

Calculating the adjusted value of collateral

$$C_A = \frac{C}{1 + H_E + H_C + H_{FX}} = \frac{1{,}000}{1 + 0 + 0.66 + 0.264} \approx 519.75$$

$$r^* \times E = r \times (E - C_A) + r \times w \times C_A$$
$$r^* \times 950 = 1.0 \times (950 - 519.75) + 1.0 \times 0.15 \times 519.75$$
$$r^* \approx 53.5\,\%$$

Credit exposure of € 950 x risk weight of 53.5 % x 8 % = capital charge of € 40.66

2nd example

Bank A lends € 1,000 to Bank B (20 % risk weight) at a maturity of three years. Bank B makes a cash deposit with Bank A at a maturity of two years (maturity mismatch), the deposit is denominated in US dollars and is worth € 950, and is revalued every 125 business days. The conditions for on-balance-sheet netting are met (for on-balance-sheet netting, w = 0).

Calculating the haircut for maturity mismatch

$$H = H_{10}\sqrt{\frac{N_{RV} + 19}{10}} = 0.08\sqrt{\frac{125 + 19}{10}} \approx 0.304$$

Calculating the adjusted value of collateral

$$C_A = \frac{C}{1 + H_E + H_C + H_{FX}} = \frac{950}{1 + 0 + 0 + 0.304} \approx 728.53$$

$$r^* \times E = r \times (E - C_A) + r \times w \times C_A$$
$$r^* \times 1{,}000 = 0.2 \times (1{,}000 - 728.53) + 0.2 \times 0 \times 728.53$$
$$r^* \approx 5.4\,\%$$

Credit exposure of € 1,000 x risk weight of 5.4 % x 8 % = capital charge of € 4.32

Calculating the maturity mismatch

$$r^{**} = \left(1 - \frac{t}{T}\right) \times r + \left(\frac{t}{T}\right) \times r^* = \left(1 - \frac{2}{3}\right) \times 0.2 + \left(\frac{2}{3}\right) \times 0.054 \approx 0.103$$

$r^{**} \approx 10.3\,\%$

Credit exposure of € 1,000 x risk weight of 10.3 % x 8 % = capital charge of € 8.24

3rd example

In a repo transaction, Bank A sells AAA government bonds (worth € 1,000 and having a maturity of 10 years) and receives cash deposits in return (€ 1,000) from Bank B (with a 20 % risk weight). The conditions for w = 0 are not met; bank A is not a major market player. Daily marking to market and remargining are conducted (which means H_{10} from the table on page 23 may be used); no maturity or currency mismatch. The risk to Bank A is that Bank B might no longer perform the securities repurchase transaction and that the securities may rise in value until then.

Calculating the adjusted value of collateral

$$C_A = \frac{C}{1 + H_E + H_C + H_{FX}} = \frac{1{,}000}{1 + 0.04 + 0 + 0} \approx 961.54$$

Capital requirement, bearing in mind that this is partial collateralisation (961.54 < 1,000)

$r^* \times E = r \times (E - C_A) + r \times w \times C_A$

$r^* \times 1{,}000 = 0.2 \times (1{,}000 - 961.54) + 0.2 \times 0.15 \times 961.54$

$r^* \approx 3.7\,\%$

Credit exposure of € 1,000 x risk weight of 3.7 % x 8 % = capital charge of € 2.96

Internal ratings-based approach (IRB approach)

Unlike the standardised approach, where regulatory risk weights are to be used, the risk weights used in the IRB approach are individually calculated by the banks for the risk components of every single loan using a continuous function mandated by the supervisory authority.

Calculating the capital requirements for a loan in the IRB approach

Explanations of the symbols

PD probability of default

EAD exposure at default; expected amount of exposure to borrower at the time of default

LGD loss given default, expressed as a percentage of the loan

M maturity

EK capital requirement (in German, *Eigenkapitalanforderung*)

RW risk weight

BRW benchmark risk weight[15]

N distribution function for a standard normal distributed random variable (mean zero, variance of one)

G inverse cumulative distribution function for a standard normal random variable

15 The benchmark risk weights for enterprises in the IRB approach are set using, for instance, credit risk models. Although credit risk models cannot yet be recognised for supervisory purposes at present (the computation of default correlations for borrowers is still beset with problems at present, and methods still need to be developed for adequately validating credit risk models), it makes sense to calculate the relative risk weights using credit risk models. The relative risk weights define the slope of the curve of benchmark risk weights. The absolute values of benchmark risk weights derive from the goal of calibrating capital charges on credit risk at an average of 6.4 % (8 % capital requirement minus 1.6 percentage points for operational risk) and depend greatly on the distribution of the representative average portfolio's risk assets among the various risk classes. In a first step, credit risk models calculate the economic capital for the bank's entire loan portfolio and, in a second step, allocate it among the individual loans. The amount of economic capital allocated to an individual loan depends in general not only on its characteristics but additionally on the composition of the portfolio. This effect is not desirable for the proposed capital charge, which is intended to depend only on the characteristics of the loan (e. g. its probability of default). However, there are two assumptions under which the allocation of economic capital to the various loans does not depend on the composition of the portfolio: (a) there is only one systematic risk factor that influences the correlations between the borrowers; and (b) the portfolio is infinite or asymptotically granular. The Basel Committee therefore chose a "single-factor" credit risk model when setting the relative risk weights in the IRB approach, assuming an asymptotically granular portfolio. At the same time, depending on the granularity of the portfolio, the capital requirement is adjusted for the impact of the simplifying assumption (b). Assumption (a), which says only one systematic factor exists, presents a greater constriction, however. It is assumed de facto that a monolithic economic cycle exists which influences all borrowers.

To obtain the risk-weighted asset for a loan, the EAD of a loan is multiplied by the risk weight. We then take this result, multiply it by 8 %, and obtain the capital requirement for the loan. The risk weight is defined as a function of PD and LGD (and M). The function for the risk weights depends on the class of risk assets. So far, one function has been defined for loans to enterprises, banks and governments, and another for loans to individuals.

For the capital requirement (EK) on a corporate loan, the following formulas apply in the IRB approach:

(1) EK = risk-weighted asset x 8 % = EAD x risk weight (RW) % x 8 %.

RW is calculated as follows:

(2) RW (LGD; PD) = min {LGD/50 x BRW (PD); 12.5 x LGD}.[16]

BRW is the benchmark risk weight which depends on PD and which assumes an LGD of 50 % and an average residual maturity of three years. In the IRB approach, a standard residual maturity M of three years is assumed. M does not explicitly enter into the calculation of the risk weights, but was implied in the calibration.

(3) BRW(PD) = 976.5 x N(1.118 x G(PD) + 1.288) x (1 + 0.0470 x (1 – PD)/PD$^{0.44}$).[17]

N is the distribution function of a standard normal distributed random variable and G the attendant inverse cumulative distribution function for a standard normal random variable N^{-1}.

When using the advanced IRB approach, formula (2) is modified as follows:

(2') RW (LGD; PD; M) = min{LGD/50 x BRW(PD) x [1 + b(PD) x (M – 3)]; 12.5 x LGD}.

When using the advanced IRB approach, the residual maturity M is determined for internal banking purposes as the maximum period of time the borrower may use to meet his contractual obligations. M is at least one year and no more than seven years, i. e. long-term liabilities enter into the equation with a residual maturity of no more than seven years. Thus, in the advanced IRB approach, M is not given a standard definition of three years like in the foundation IRB approach; instead, its actual value enters into the risk weight. The impact the residual maturity exerts on the risk weight depends on the function b(PD). At present, two options for this function are now under discussion.

According to the marking to market model (MTM model), b(PD) is as follows:

$$b(PD) = \frac{0.0235 \times (1 - PD)}{PD^{0.44} + 0.0470 \times (1 - PD)}.$$

According to the default mode model (DM model), b(PD) is:

b(PD) = 7.6752 PD^2 – 1.9211 PD + 0.0774 for PD < 0.05.

b(PD) = 0 for PD ≥ 0.05 (to avoid a negative factor when adjusting the residual maturity).

The two proposed functions differ above all in their function values given low PD values, i. e. in their impact on residual maturity and the risk

16 The LGD (as a percentage) is to be multiplied by 100 before being inserted (e. g. 50 is inserted for 50 %).
17 PD is given as a decimal figure (e. g. 0.01 instead of 1 %).

weight for good borrowers (and consequently also on the capital requirement). Debate is still going on as to which of the aforementioned approaches will ultimately prevail (see the main body of this article).

The PD of a loan to an enterprise is generally determined by the PD of the internal rating category assigned to the borrower in both the foundation IRB approach and the advanced IRB approach. If the one-year PD estimated by the credit institution itself is below 0.03 %, a minimum PD of 0.03 % is taken as the basis for calculating the risk weight. When internally estimating the one-year PD, an average of many years is to be assumed.

In cases where a credit is secured by a guarantee or a credit derivative, the PD for the collateralised part of the credit is reduced to PD*, where

(4) $PD^* = w \times PD_B + (1-w) \times PD_G$.

PD_B denotes the borrower's PD, and PD_G the PD of the guarantor. Thus, a weighted average of the borrower's PD and the guarantor's PD is formed. w is generally 0.15; for guarantees given by sovereigns, central banks and commercial banks, which are also given a zero weight in the standardised approach, w = 0. With the help of the w factor, the residual risk that remains with the borrower even after transfer of the credit risk is backed by capital. Ultimately, the result of a reduction in PD is a relaxation of the capital requirement if the guarantor's PD is less than that of the borrower. However, this capital requirement is relaxed only for exposures which are collateralised by guarantors or sellers of credit derivatives recognised under the standardised approach. In the advanced IRB approach, the bank itself estimates the degree of transfer of risk from the borrower to the guarantor or seller of credit derivatives. It is not restricted to the guarantors or sellers of credit derivatives recognised under the standardised approach and is not required to apply a w factor.

If a bank uses the foundation IRB approach, the national supervisor requires a 50 % LGD for senior unsecured claims and a 75 % LGD for unsecured subordinated claims. By contrast, banks using the advanced IRB approach use their own LGD estimates.

In the foundation IRB approach, the collateral instruments recognised in the standard approach (financial collateral) and collateral in the form of commercial or residential real estate are taken into account. Other forms of collateral are not recognised by the foundation IRB approach as mitigating credit risk. Recognised collateral leads to a reduction in LGD. For exposures secured by financial collateral, the adjusted LGD (LGD*) is calculated as follows:

(5) $LGD^* = LGD \times [1-(1-w) \times C_A/E)]$ for $E > C_A$ and
$LGD^* = w \times LGD$ for $E < C_A$

E is the amount of the claim, and CA the current value of the collateral after taking the collateral haircuts into account. w is 0.15 or 0, depending on the collateral. Haircuts are calculated the same way as in the standardised approach (see above). The use of commercial or residential real estate may, in the foundation IRB approach, reduce the LGD by up to 10 percentage points (depending on the current value of the collateral). LGD* is calculated as:

(6) $LGD^* = 50\ \%$ for $C/E \leq 30\ \%$
$LGD^* = 40\ \%$ for $C/E > 140\ \%$

LGD* = {1-[0.2 x (C/E)/140 %]} x 50 % for
30 % < C/E ≤ 140 %

E is the nominal exposure and C the current value of the collateral. In the advanced IRB approach a bank may use all own LGD estimates, i. e. all types of collateral are recognised if the additional minimum requirements are met and adequate time series information can be presented.

In the foundation IRB approach, EAD is, for on-balance-sheet items, the book value of the loan, and for off-balance-sheet transactions (with the exception of foreign-exchange, interest-rate, equity and commodity-related derivatives), the unused committed credit line, multiplied by a credit conversion factor (CCF) of 75 %. Excluded here are uncommitted credit lines, facilities that are unconditionally cancellable or facilities that can be automatically cancelled, e. g. if a borrower's creditworthiness deteriorates. In the advanced IRB approach, EADs based on own estimates of CCFs are allowed.

For foreign-exchange, interest-rate, equity and commodity-related derivatives, as previously done under the mark-to-market method, a credit equivalent amount will be calculated made up of replacement costs plus an add-on for estimated future exposure depending on the type of product and the residual maturity.

Examples

The following examples will show how the capital requirement is calculated in the IRB approach, i. e. for both the foundation IRB approach and for the advanced approach. All examples will show, in the advanced IRB approach, how the capital requirement is calculated in order to cover the maturity component in both approaches:

RWA_1 shows the calculation according to the mark-to-market model;

RWA_2 according to the default mode model (see page 37 of the Annex).

1st example

(Senior) loan of € 1,000 to an enterprise with a PD = 1 % (residual maturity: 5 years)

Foundation IRB approach:

RWA = EAD x RW(LGD; PD)%, where
EAD = € 1,000,
LGD = 50 % and
PD = 1 %

RW (50; 0.01) = min {50/50 x BRW (0.01); 12.5 x 50}
= min {125 ; 625}
= 125

RWA = € 1,000 x RW (50 ; 0.01)%
= € 1,000 x 125 %
= € 1,250

RWA x 8 % = € 1,250 x 8 % = capital charge of € 100

Advanced IRB approach

RWA = EAD x RW(LGD; PD; M)%, where

EAD = € 1,000, M = 5 years, PD = 1%, and the own estimate of LGD is 50 %

RW (50 ; 0.01 ; 5) = min {LGD/50 x BRW (0.01) x
[1 + b (0.01) x (5-3)];
12.5 x LGD}
= min {50/50 x 125 x [1 + b (0.01)
x 2]; 12.5 x 50}

RWA_1 = € 1,000 x min {50/50 x 125 x
[1 + 0.13044 x 2]; 12.5 x 50} %
≈ € 1,576.10

RWA_2 = € 1,000 x min {50/50 x 125 x
[1 + 0.05896 x 2]; 12.5 x 50} %
≈ € 1,397.40

RWA_1 x 8 % = capital charge of € 126.09

RWA_2 x 8 % = capital charge of € 111.79

2nd example

(Senior) loan of € 1,000 to an enterprise where

PD = 0.4 % (residual maturity = 5 years)

Foundation IRB approach

RWA = EAD x RW(LGD; PD) %, where
EAD = € 1,000,
LGD = 50 % and
PD = 0.4 %

RW (50 ; 0.004) = min {50/50 x BRW (0.004);
12.5 x 50}
= min {70 ; 625}
= 70

RWA = € 1,000 x RW (50 ; 0.04) %
= € 1,000 x 70 %
= € 700

RWA x 8 % = € 700 x 8 % = capital charge of € 56

Advanced IRB approach

RWA = EAD x RW(LGD; PD; M)%, where

EAD = € 1,000, M = 5 years, PD = 0.4 %, and the own estimate of LGD is 50 %

RW (50 ; 0.004 ; 5) = min {LGD/50 x BRW (0.004) x
[1 + b (0.004) x (5-3)]; 12.5 x LGD}
= min {50/50 x 70 x [1 + b (0.004)
x 2]; 12.5 x 50}

RWA_1 = € 1,000 x min {50/50 x 70 x
[1 + 0.1735 x 2]; 12.5 x 50} % ≈ € 942.90

RWA_2 = € 1,000 x min {50/50 x 70 x
[1 + 0.0698 x 2]; 12.5 x 50} % ≈ € 797.72

RWA_1 x 8 % = capital charge of € 75.43

RWA_2 x 8 % = capital charge of € 63.82

3rd example

(Senior) loan of € 1,000 to an enterprise where

PD = 0.03 % (residual maturity: 5 years)

Foundation IRB approach

RWA = EAD x RW(LGD; PD) %, where
EAD = € 1,000,
LGD = 50 % and
PD = 0.03 %

RW (50 ; 0.0003) = min {50/50 x BRW (0.0003);
12.5 x 50}
= min {14 ; 625}
= 14

RWA = € 1,000 x 14 %
= € 140

RWA x 8 % = € 140 x 8 % = capital charge of € 11.20

Advanced IRB approach

RWA = EAD x RW(LGD; PD; M)%, where

EAD = € 1,000, M = 5 years, PD = 0.03 %, and the own estimate of LGD is 50 %

RW (50 ; 0.0003 ; 5) = min {LGD/50 x BRW (0.0003) x [1 + b (0.0003) x (5-3)]; 12.5 x LGD}
= min {50/50 x 14 x [1 + b (0.0003) x 2]; 12.5 x 50}

RWA_1 = € 1,000 x min {50/50 x 14 x [1 + 0.31255 x 2]; 12.5 x 50} % ≈ € 227.51

RWA_2 = € 1,000 x min {50/50 x 14 x [1 + 0.0768 x 2]; 12.5 x 50} % ≈ € 161.50

RWA_1 x 8 % = capital charge of € 18.20

RWA_2 x 8 % = capital charge of € 12.92

4th example

(Senior) loan of € 1,000 (maturity: 5 years) to an enterprise (PD = 1 %), securities as collateral (issuer: an AA-rated bank, residual maturity: 7 years, rating of security: AA, market value: € 990, daily remargining)

Foundation IRB approach

RWA = EAD x RW(LGD*; PD) %, where
EAD = € 1,000,
LGD = 50 %,
PD = 1%

LGD* = LGD x [1 – (1-w) x (CA/E)] where
C_A = C/(1 + H_C) = € 916.67
(C = € 990, H_C = 0.08),
E = € 1,000, w = 0.15

LGD* = LGD x [1 – (1–w) x (C_A/E)] =
50 % x [1 – 0.85 x (917/1,000)] = 11%

RW (11 ; 0.01) = min {11/50 x BRW (0.01); 12.5 x 11}
= min {27.5 ; 137.5}
= 27.5

RWA = € 1,000 x 27.5 %
= € 275

RWA x 8 % = capital charge of € 22

Advanced IRB approach

RWA = EAD x RW(LGD*; PD; M) %, where

EAD = € 1,000,
PD = 1%,
LGD is estimated at 11 %,
M = 5 years

RW (11 ; 0.01 ; 5) = min {LGD/50 x BRW (0.01) x [1 + b (0.01) x (5-3)]; 12.5 x LGD}
= min {11/50 x 125 x [1 + b (0.01) x 2]; 12.5 x 11}

RWA_1 = € 1,000 x min {11/50 x 125 x [1 + 0.13044 x 2]; 12.5 x 11} %
≈ € 346.74

RWA_2 = € 1,000 x min {11/50 x 125 x [1 + 0.05896 x 2]; 12.5 x 11} %
≈ € 307.43

RWA_1 x 8 % = capital charge of € 27.74

RWA_2 x 8 % = capital charge of € 24.59