

Part 2: The First Pillar – Minimum Capital Requirements

I. Calculation of minimum capital requirements

40. Part 2 presents the calculation of the total minimum capital requirements for credit, market and operational risk. The capital ratio is calculated using the definition of regulatory capital and risk-weighted assets. The total capital ratio must be no lower than 8%. Tier 2 capital is limited to 100% of Tier 1 capital.

A. Regulatory capital

41. The definition of eligible regulatory capital, as outlined in the 1988 Accord and clarified in the 27 October 1998 press release on “Instruments eligible for inclusion in Tier 1 capital”, remains in place except for the modifications in paragraphs 37 to 39 and 43. The definition is outlined in paragraphs 49 (i) to 49 (xviii) and in Annex Ia.

42. Under the standardised approach to credit risk, general provisions, as explained in paragraphs 381 to 383, can be included in Tier 2 capital subject to the limit of 1.25% of risk-weighted assets.

43. Under the internal ratings-based (IRB) approach, the treatment of the 1988 Accord to include general provisions (or general loan-loss reserves) in Tier 2 capital is withdrawn. Banks using the IRB approach for securitisation exposures or the PD/LGD approach for equity exposures must first deduct the EL amounts subject to the corresponding conditions in paragraphs 563 and 386, respectively. Banks using the IRB approach for other asset classes must compare (i) the amount of total eligible provisions, as defined in paragraph 380, with (ii) the total expected losses amount as calculated within the IRB approach and defined in paragraph 375. Where the total expected loss amount exceeds total eligible provisions, banks must deduct the difference. Deduction must be on the basis of 50% from Tier 1 and 50% from Tier 2. Where the total expected loss amount is less than total eligible provisions, as explained in paragraphs 380 to 383, banks may recognise the difference in Tier 2 capital up to a maximum of 0.6% of credit risk-weighted assets. At national discretion, a limit lower than 0.6% may be applied.

B. Risk-weighted assets

44. Total risk-weighted assets are determined by multiplying the capital requirements for market risk and operational risk by 12.5 (i.e. the reciprocal of the minimum capital ratio of 8%) and adding the resulting figures to the sum of risk-weighted assets for credit risk. The Committee applies a scaling factor in order to broadly maintain the aggregate level of minimum capital requirements, while also providing incentives to adopt the more advanced risk-sensitive approaches of the Framework.¹¹ The scaling factor is applied to the risk-weighted asset amounts for credit risk assessed under the IRB approach.

¹¹ The current best estimate of the scaling factor is 1.06. National authorities will continue to monitor capital requirements during the implementation period of this Framework. Moreover, the Committee will monitor national experiences with this Framework.

C. Transitional arrangements

45. For banks using the IRB approach for credit risk or the Advanced Measurement Approaches (AMA) for operational risk, there will be a capital floor following implementation of this Framework. Banks must calculate the difference between (i) the floor as defined in paragraph 46 and (ii) the amount as calculated according to paragraph 47. If the floor amount is larger, banks are required to add 12.5 times the difference to risk-weighted assets.

46. The capital floor is based on application of the 1988 Accord. It is derived by applying an adjustment factor to the following amount: (i) 8% of the risk-weighted assets, (ii) plus Tier 1 and Tier 2 deductions, and (iii) less the amount of general provisions that may be recognised in Tier 2. The adjustment factor for banks using the foundation IRB approach for the year beginning year-end 2006 is 95%. The adjustment factor for banks using (i) either the foundation and/or advanced IRB approaches, and/or (ii) the AMA for the year beginning year-end 2007 is 90%, and for the year beginning year-end 2008 is 80%. The following table illustrates the application of the adjustment factors. Additional transitional arrangements including parallel calculation are set out in paragraphs 263 to 269.

	From year-end 2005	From year-end 2006	From year-end 2007	From year-end 2008
Foundation IRB approach ¹²	Parallel calculation	95%	90%	80%
Advanced approaches for credit and/or operational risk	Parallel calculation or impact studies	Parallel calculation	90%	80%

47. In the years in which the floor applies, banks must also calculate (i) 8% of total risk-weighted assets as calculated under this Framework, (ii) less the difference between total provisions and expected loss amount as described in Section III.G (see paragraphs 374 to 386), and (iii) plus other Tier 1 and Tier 2 deductions. Where a bank uses the standardised approach to credit risk for any portion of its exposures, it also needs to exclude general provisions that may be recognised in Tier 2 for that portion from the amount calculated according to the first sentence of this paragraph.

48. Should problems emerge during this period, the Committee will seek to take appropriate measures to address them, and, in particular, will be prepared to keep the floors in place beyond 2009 if necessary.

49. The Committee believes it is appropriate for supervisors to apply prudential floors to banks that adopt the IRB approach for credit risk and/or the AMA for operational risk following year-end 2008. For banks that do not complete the transition to these approaches in the years specified in paragraph 46, the Committee believes it is appropriate for supervisors to continue to apply prudential floors — similar to those of paragraph 46 — to provide time to ensure that individual bank implementations of the advanced approaches are sound. However, the Committee recognises that floors based on the 1988 Accord will become increasingly impractical to implement over time and therefore believes that supervisors should have the flexibility to develop appropriate bank-by-bank floors that are

¹² The foundation IRB approach includes the IRB approach to retail.

consistent with the principles outlined in this paragraph, subject to full disclosure of the nature of the floors adopted. Such floors may be based on the approach the bank was using before adoption of the IRB approach and/or AMA.

Ia. The constituents of capital

A. Core capital (basic equity or Tier 1)

49(i). The Committee considers that the key element of capital on which the main emphasis should be placed is equity capital¹³ and disclosed reserves. This key element of capital is the only element common to all countries' banking systems; it is wholly visible in the published accounts and is the basis on which most market judgements of capital adequacy are made; and it has a crucial bearing on profit margins and a bank's ability to compete. This emphasis on equity capital and disclosed reserves reflects the importance the Committee attaches to securing an appropriate quality, and the level, of the total capital resources maintained by major banks.

49(ii). Notwithstanding this emphasis, the member countries of the Committee also consider that there are a number of other important and legitimate constituents of a bank's capital base which may be included within the system of measurement (subject to certain conditions set out in paragraphs 49(iv) to 49(xii) below).

49(iii). The Committee has therefore concluded that capital, for supervisory purposes, should be defined in two tiers in a way which will have the effect of requiring at least 50% of a bank's capital base to consist of a core element comprised of equity capital and published reserves from post-tax retained earnings (Tier 1). The other elements of capital (supplementary capital) will be admitted into Tier 2 limited to 100% of Tier 1. These supplementary capital elements and the particular conditions attaching to their inclusion in the capital base are set out in paragraphs 49(iv) to 49(xii) below and in more detail in Annex 1a. Each of these elements may be included or not included by national authorities at their discretion in the light of their national accounting and supervisory regulations.

B. Supplementary capital (Tier 2)

1. Undisclosed reserves

49(iv). Unpublished or hidden reserves may be constituted in various ways according to differing legal and accounting regimes in member countries. Under this heading are included only reserves which, though unpublished, have been passed through the profit and loss account and which are accepted by the bank's supervisory authorities. They may be inherently of the same intrinsic quality as published retained earnings, but, in the context of an internationally agreed minimum standard, their lack of transparency, together with the fact that many countries do not recognise undisclosed reserves, either as an accepted accounting concept or as a legitimate element of capital, argue for excluding them from the core equity capital element.

¹³ Issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock (but excluding cumulative preferred stock).

2. Revaluation reserves

49(v). Some countries, under their national regulatory or accounting arrangements, allow certain assets to be revalued to reflect their current value, or something closer to their current value than historic cost, and the resultant revaluation reserves to be included in the capital base. Such revaluations can arise in two ways:

- (a) from a formal revaluation, carried through to the balance sheets of banks' own premises; or
- (b) from a notional addition to capital of hidden values which arise from the practice of holding securities in the balance sheet valued at historic costs.

Such reserves may be included within supplementary capital provided that the assets are considered by the supervisory authority to be prudently valued, fully reflecting the possibility of price fluctuations and forced sale.

49(vi). Alternative (b) in paragraph 49(v) above is relevant to those banks whose balance sheets traditionally include very substantial amounts of equities held in their portfolio at historic cost but which can be, and on occasions are, realised at current prices and used to offset losses. The Committee considers these "latent" revaluation reserves can be included among supplementary elements of capital since they can be used to absorb losses on a going-concern basis, provided they are subject to a substantial discount in order to reflect concerns both about market volatility and about the tax charge which would arise were such cases to be realised. A discount of 55% on the difference between the historic cost book value and market value is agreed to be appropriate in the light of these considerations. The Committee considered, but rejected, the proposition that latent reserves arising in respect of the undervaluation of banks' premises should also be included within the definition of supplementary capital.

3. General provisions/general loan-loss reserves

49(vii). General provisions or general loan-loss reserves are created against the possibility of losses not yet identified. Where they do not reflect a known deterioration in the valuation of particular assets, these reserves qualify for inclusion in Tier 2 capital. Where, however, provisions or reserves have been created against identified losses or in respect of an identified deterioration in the value of any asset or group of subsets of assets, they are not freely available to meet unidentified losses which may subsequently arise elsewhere in the portfolio and do not possess an essential characteristic of capital. Such provisions or reserves should therefore not be included in the capital base.

49(viii). The supervisory authorities represented on the Committee undertake to ensure that the supervisory process takes due account of any identified deterioration in value. They will also ensure that general provisions or general loan-loss reserves will only be included in capital if they are not intended to deal with the deterioration of particular assets, whether individual or grouped.

49(ix). This would mean that all elements in general provisions or general loan-loss reserves designed to protect a bank from identified deterioration in the quality of specific assets (whether foreign or domestic) should be ineligible for inclusion in capital. In particular, elements that reflect identified deterioration in assets subject to country risk, in real estate lending and in other problem sectors would be excluded from capital.

49(x). General provisions/general loan-loss reserves that qualify for inclusion in Tier 2 under the terms described above do so subject to a limit of

- (a) 1.25 percentage points of weighted risk assets to the extent a bank uses the Standardised Approach for credit risk; and
- (b) 0.6 percentage points of credit risk-weighted assets in accordance with paragraph 43 to the extent a bank uses the IRB Approach for credit risk.

4. Hybrid debt capital instruments

49(xi). In this category fall a number of capital instruments which combine certain characteristics of equity and certain characteristics of debt. Each of these has particular features which can be considered to affect its quality as capital. It has been agreed that, where these instruments have close similarities to equity, in particular when they are able to support losses on an on-going basis without triggering liquidation, they may be included in supplementary capital. In addition to perpetual preference shares carrying a cumulative fixed charge, the following instruments, for example, may qualify for inclusion: long-term preferred shares in Canada, titres participatifs and titres subordonnés à durée indéterminée in France, Genussscheine in Germany, perpetual debt instruments in the United Kingdom and mandatory convertible debt instruments in the United States. The qualifying criteria for such instruments are set out in Annex 1a.

5. Subordinated term debt

49(xii). The Committee is agreed that subordinated term debt instruments have significant deficiencies as constituents of capital in view of their fixed maturity and inability to absorb losses except in a liquidation. These deficiencies justify an additional restriction on the amount of such debt capital which is eligible for inclusion within the capital base. Consequently, it has been concluded that subordinated term debt instruments with a minimum original term to maturity of over five years may be included within the supplementary elements of capital, but only to a maximum of 50% of the core capital element and subject to adequate amortisation arrangements.

C. Short-term subordinated debt covering market risk (Tier 3)

49(xiii). The principal form of eligible capital to cover market risks consists of shareholders' equity and retained earnings (Tier 1 capital) and supplementary capital (Tier 2 capital) as defined in paragraphs 49(i) to 49(xii). But banks may also, at the discretion of their national authority, employ a third tier of capital ("Tier 3"), consisting of short-term subordinated debt as defined in paragraph 49(xiv) below for the *sole* purpose of meeting a proportion of the capital requirements for market risks, subject to the following conditions:

- Banks will be entitled to use Tier 3 capital solely to support market risks as defined in paragraphs 709 to 718(Lxix). This means that any capital requirement arising in respect of credit and counterparty risk in the terms of this Framework, including the credit counterparty risk in respect of OTCs and SFTs in both trading and banking books, needs to be met by the existing definition of capital base set out in paragraphs 49(i) to 49(xii) above (i.e. Tiers 1 and 2);
- Tier 3 capital will be limited to 250% of a bank's Tier 1 capital that is required to support market risks. This means that a minimum of about 28½% of market risks needs to be supported by Tier 1 capital that is not required to support risks in the remainder of the book;

- Tier 2 elements may be substituted for Tier 3 up to the same limit of 250% in so far as the overall limits set out in paragraph 49(iii) above are not breached, that is to say eligible Tier 2 capital may not exceed total Tier 1 capital, and long-term subordinated debt may not exceed 50% of Tier 1 capital;
- In addition, since the Committee believes that Tier 3 capital is only appropriate to meet market risk, a significant number of member countries are in favour of retaining the principle in the present Framework that Tier 1 capital should represent at least half of total eligible capital, i.e. that the sum total of Tier 2 plus Tier 3 capital should not exceed total Tier 1. However, the Committee has decided that any decision whether or not to apply such a rule should be a matter for national discretion. Some member countries may keep the constraint, except in cases where banking activities are proportionately very small. Additionally, national authorities will have discretion to refuse the use of short-term subordinated debt for individual banks or for their banking systems generally.

49(xiv). For short-term subordinated debt to be eligible as Tier 3 capital, it needs, if circumstances demand, to be capable of becoming part of a bank's permanent capital and thus be available to absorb losses in the event of insolvency. It must, therefore, at a minimum:

- be unsecured, subordinated and fully paid up;
- have an original maturity of at least two years;
- not be repayable before the agreed repayment date unless the supervisory authority agrees;
- be subject to a lock-in clause which stipulates that neither interest nor principal may be paid (even at maturity) if such payment means that the bank falls below or remains below its minimum capital requirement.

D. Deductions from capital

49(xv). It has been concluded that the following deductions should be made from the capital base for the purpose of calculating the risk-weighted capital ratio. The deductions will consist of:

- (i) Goodwill, as a deduction from Tier 1 capital elements;
- (ii) Increase in equity capital resulting from a securitisation exposure, as a deduction from Tier 1 capital elements, pursuant to paragraph 562 below;
- (iii) Investments in subsidiaries engaged in banking and financial activities which are not consolidated in national systems. The normal practice will be to consolidate subsidiaries for the purpose of assessing the capital adequacy of banking groups. Where this is not done, deduction is essential to prevent the multiple use of the same capital resources in different parts of the group. The deduction for such investments will be made in accordance with paragraph 37 above. The assets representing the investments in subsidiary companies whose capital had been deducted from that of the parent would not be included in total assets for the purposes of computing the ratio.

49(xvi). The Committee carefully considered the possibility of requiring deduction of banks' holdings of capital issued by other banks or deposit-taking institutions, whether in the form of equity or of other capital instruments. Several G-10 supervisory authorities currently require such a deduction to be made in order to discourage the banking system as a whole from creating cross-holdings of capital, rather than drawing capital from outside investors. The Committee is very conscious that such double-gearing (or "double-leveraging") can have systemic dangers for the banking system by making it more vulnerable to the rapid transmission of problems from one institution to another and some members consider these dangers justify a policy of full deduction of such holdings.

49(xvii). Despite these concerns, however, the Committee as a whole is not presently in favour of a general policy of deducting all holdings of other banks' capital, on the grounds that to do so could impede certain significant and desirable changes taking place in the structure of domestic banking systems.

49(xviii). The Committee has nonetheless agreed that:

- (a) Individual supervisory authorities should be free at their discretion to apply a policy of deduction, either for all holdings of other banks' capital, or for holdings which exceed material limits in relation to the holding bank's capital or the issuing bank's capital, or on a case-by-case basis;
- (b) Where no deduction is applied, banks' holdings of other banks' capital instruments will bear a weight of 100%;
- (c) The Committee considers that reciprocal cross-holdings of bank capital artificially designed to inflate the capital position of the banks will be deducted for capital adequacy purposes;
- (d) The Committee will closely monitor the degree of double-gearing in the international banking system and does not preclude the possibility of introducing constraints at a later date. For this purpose, supervisory authorities intend to ensure that adequate statistics are made available to enable them and the Committee to monitor the development of banks' holdings of other banks' equity and debt instruments which rank as capital under the present agreement.

II. Credit Risk – The Standardised Approach

50. The Committee permits banks a choice between two broad methodologies for calculating their capital requirements for credit risk. One alternative, the Standardised Approach, will be to measure credit risk in a standardised manner, supported by external credit assessments.¹⁴

51. The other alternative, the Internal Ratings-based Approach, which is subject to the explicit approval of the bank's supervisor, would allow banks to use their internal rating systems for credit risk.

52. The following section sets out revisions to the 1988 Accord for risk weighting banking book exposures. Exposures that are not explicitly addressed in this section will retain the current treatment; however, exposures related to securitisation are dealt with in Section IV. Furthermore, the credit equivalent amount of Securities Financing Transactions (SFT)¹⁵ and OTC derivatives that expose a bank to counterparty credit risk¹⁶ is to be calculated under the rules set forth in Annex 4¹⁷. In determining the risk weights in the standardised approach, banks may use assessments by external credit assessment institutions recognised as eligible for capital purposes by national supervisors in accordance with the criteria defined in paragraphs 90 and 91. Exposures should be risk-weighted net of specific provisions.¹⁸

A. Individual claims

1. Claims on sovereigns

53. Claims on sovereigns and their central banks will be risk weighted as follows:

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk Weight	0%	20%	50%	100%	150%	100%

¹⁴ The notations follow the methodology used by one institution, Standard & Poor's. the use of Standard & Poor's credit ratings is an example only; those of some other external credit assessment institutions could equally well be used. The ratings used throughout this document, therefore, do not express any preferences or determinations on external assessment institutions by the Committee.

¹⁵ Securities Financing Transactions (SFT) are transactions such as repurchase agreements, reverse repurchase agreements, security lending and borrowing, and margin lending transactions, where the value of the transactions depends on the market valuations and the transactions are often subject to margin agreements.

¹⁶ The counterparty credit risk is defined as the risk that the counterparty to a transaction could default before the final settlement of the transaction's cash flows. An economic loss would occur if the transactions or portfolio of transactions with the counterparty has a positive economic value at the time of default. Unlike a firm's exposure to credit risk through a loan, where the exposure to credit risk is unilateral and only the lending bank faces the risk of loss, the counterparty credit risk creates a bilateral risk of loss: the market value of the transaction can be positive or negative to either counterparty to the transaction. The market value is uncertain and can vary over time with the movement of underlying market factors.

¹⁷ Annex 4 of this Framework is based on the treatment of counterparty credit risk set out in Part 1 of the Committee's paper *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects* (July 2005).

¹⁸ A simplified standardised approach is outlined in Annex 11.

54. At national discretion, a lower risk weight may be applied to banks' exposures to their sovereign (or central bank) of incorporation denominated in domestic currency and funded¹⁹ in that currency.²⁰ Where this discretion is exercised, other national supervisory authorities may also permit their banks to apply the same risk weight to domestic currency exposures to this sovereign (or central bank) funded in that currency.

55. For the purpose of risk weighting claims on sovereigns, supervisors may recognise the country risk scores assigned by Export Credit Agencies (ECAs). To qualify, an ECA must publish its risk scores and subscribe to the OECD agreed methodology. Banks may choose to use the risk scores published by individual ECAs that are recognised by their supervisor, or the consensus risk scores of ECAs participating in the "Arrangement on Officially Supported Export Credits".²¹ The OECD agreed methodology establishes eight risk score categories associated with minimum export insurance premiums. These ECA risk scores will correspond to risk weight categories as detailed below.

ECA risk scores	0-1	2	3	4 to 6	7
Risk weight	0%	20%	50%	100%	150%

56. Claims on the Bank for International Settlements, the International Monetary Fund, the European Central Bank and the European Community may receive a 0% risk weight.

2. Claims on non-central government public sector entities (PSEs)

57. Claims on domestic PSEs will be risk-weighted at national discretion, according to either option 1 or option 2 for claims on banks.²² When option 2 is selected, it is to be applied without the use of the preferential treatment for short-term claims.

58. Subject to national discretion, claims on certain domestic PSEs may also be treated as claims on the sovereigns in whose jurisdictions the PSEs are established.²³ Where this

¹⁹ This is to say that the bank would also have corresponding liabilities denominated in the domestic currency.

²⁰ This lower risk weight may be extended to the risk weighting of collateral and guarantees. See Sections II.D.3 and II.D.5.

²¹ The consensus country risk classification is available on the OECD's website (<http://www.oecd.org>) in the Export Credit Arrangement web-page of the Trade Directorate.

²² This is regardless of the option chosen at national discretion for claims on banks of that country. It therefore does not imply that when one option has been chosen for claims on banks, the same option should also be applied to claims on PSEs.

²³ The following examples outline how PSEs might be categorised when focusing on one specific feature, namely revenue raising powers. However, there may be other ways of determining the different treatments applicable to different types of PSEs, for instance by focusing on the extent of guarantees provided by the central government:

- **Regional governments and local authorities** could qualify for the same treatment as claims on their sovereign or central government if these governments and local authorities have specific revenue raising powers and have specific institutional arrangements the effect of which is to reduce their risks of default.
- **Administrative bodies responsible to central governments, regional governments or to local authorities and other non-commercial undertakings** owned by the governments or local authorities may not warrant the same treatment as claims on their sovereign if the entities do not have revenue raising powers or other arrangements as described above. If strict lending rules apply to these entities and a declaration of bankruptcy is not possible because of their special public status, it may be appropriate to treat these claims in the same manner as claims on banks.

discretion is exercised, other national supervisors may allow their banks to risk weight claims on such PSEs in the same manner.

3. Claims on multilateral development banks (MDBs)

59. The risk weights applied to claims on MDBs will generally be based on external credit assessments as set out under option 2 for claims on banks but without the possibility of using the preferential treatment for short-term claims. A 0% risk weight will be applied to claims on highly rated MDBs that fulfil to the Committee's satisfaction the criteria provided below.²⁴ The Committee will continue to evaluate eligibility on a case-by-case basis. The eligibility criteria for MDBs risk weighted at 0% are:

- very high quality long-term issuer ratings, i.e. a majority of an MDB's external assessments must be AAA;
- shareholder structure is comprised of a significant proportion of sovereigns with long-term issuer credit assessments of AA- or better, or the majority of the MDB's fund-raising are in the form of paid-in equity/capital and there is little or no leverage;
- strong shareholder support demonstrated by the amount of paid-in capital contributed by the shareholders; the amount of further capital the MDBs have the right to call, if required, to repay their liabilities; and continued capital contributions and new pledges from sovereign shareholders;
- adequate level of capital and liquidity (a case-by-case approach is necessary in order to assess whether each MDB's capital and liquidity are adequate); and,
- strict statutory lending requirements and conservative financial policies, which would include among other conditions a structured approval process, internal creditworthiness and risk concentration limits (per country, sector, and individual exposure and credit category), large exposures approval by the board or a committee of the board, fixed repayment schedules, effective monitoring of use of proceeds, status review process, and rigorous assessment of risk and provisioning to loan loss reserve.

4. Claims on banks

60. There are two options for claims on banks. National supervisors will apply one option to all banks in their jurisdiction. No claim on an unrated bank may receive a risk weight lower than that applied to claims on its sovereign of incorporation.

61. Under the first option, all banks incorporated in a given country will be assigned a risk weight one category less favourable than that assigned to claims on the sovereign of that

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- **Commercial undertakings** owned by central governments, regional governments or by local authorities may be treated as normal commercial enterprises. However, if these entities function as a corporate in competitive markets even though the state, a regional authority or a local authority is the major shareholder of these entities, supervisors should decide to consider them as corporates and therefore attach to them the applicable risk weights.

²⁴ MDBs currently eligible for a 0% risk weight are: the World Bank Group comprised of the International Bank for Reconstruction and Development (IBRD) and the International Finance Corporation (IFC), the Asian Development Bank (ADB), the African Development Bank (AfDB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), the European Investment Bank (EIB), the European Investment Fund (EIF), the Nordic Investment Bank (NIB), the Caribbean Development Bank (CDB), the Islamic Development Bank (IDB), and the Council of Europe Development Bank (CEDB).

country. However, for claims on banks in countries with sovereigns rated BB+ to B- and on banks in unrated countries the risk weight will be capped at 100%.

62. The second option bases the risk weighting on the external credit assessment of the bank itself with claims on unrated banks being risk-weighted at 50%. Under this option, a preferential risk weight that is one category more favourable may be applied to claims with an original maturity²⁵ of three months or less, subject to a floor of 20%. This treatment will be available to both rated and unrated banks, but not to banks risk weighted at 150%.

63. The two options are summarised in the tables below.

Option 1

Credit assessment of Sovereign	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk weight under Option 1	20%	50%	100%	100%	150%	100%

Option 2

Credit assessment of Banks	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk weight under Option 2	20%	50%	50%	100%	150%	50%
Risk weight for short-term claims ²⁶ under Option 2	20%	20%	20%	50%	150%	20%

64. When the national supervisor has chosen to apply the preferential treatment for claims on the sovereign as described in paragraph 54, it can also assign, under both options 1 and 2, a risk weight that is one category less favourable than that assigned to claims on the sovereign, subject to a floor of 20%, to claims on banks of an original maturity of 3 months or less denominated and funded in the domestic currency.

5. *Claims on securities firms*

65. Claims on securities firms may be treated as claims on banks provided these firms are subject to supervisory and regulatory arrangements comparable to those under this

²⁵ Supervisors should ensure that claims with (contractual) original maturity under 3 months which are expected to be rolled over (i.e. where the effective maturity is longer than 3 months) do not qualify for this preferential treatment for capital adequacy purposes.

²⁶ Short-term claims in Option 2 are defined as having an original maturity of three months or less. These tables do not reflect the potential preferential risk weights for domestic currency claims that banks may be allowed to apply based on paragraph 64.

Framework (including, in particular, risk-based capital requirements).²⁷ Otherwise such claims would follow the rules for claims on corporates.

6. *Claims on corporates*

66. The table provided below illustrates the risk weighting of rated corporate claims, including claims on insurance companies. The standard risk weight for unrated claims on corporates will be 100%. No claim on an unrated corporate may be given a risk weight preferential to that assigned to its sovereign of incorporation.

Credit assessment	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Unrated
Risk weight	20%	50%	100%	150%	100%

67. Supervisory authorities should increase the standard risk weight for unrated claims where they judge that a higher risk weight is warranted by the overall default experience in their jurisdiction. As part of the supervisory review process, supervisors may also consider whether the credit quality of corporate claims held by individual banks should warrant a standard risk weight higher than 100%.

68. At national discretion, supervisory authorities may permit banks to risk weight all corporate claims at 100% without regard to external ratings. Where this discretion is exercised by the supervisor, it must ensure that banks apply a single consistent approach, i.e. either to use ratings wherever available or not at all. To prevent “cherry-picking” of external ratings, banks should obtain supervisory approval before utilising this option to risk weight all corporate claims at 100%.

7. *Claims included in the regulatory retail portfolios*

69. Claims that qualify under the criteria listed in paragraph 70 may be considered as retail claims for regulatory capital purposes and included in a regulatory retail portfolio. Exposures included in such a portfolio may be risk-weighted at 75%, except as provided in paragraph 75 for past due loans.

70. To be included in the regulatory retail portfolio, claims must meet the following four criteria:

- Orientation criterion — The exposure is to an individual person or persons or to a small business;
- Product criterion — The exposure takes the form of any of the following: revolving credits and lines of credit (including credit cards and overdrafts), personal term loans and leases (e.g. instalment loans, auto loans and leases, student and educational loans, personal finance) and small business facilities and commitments. Securities (such as bonds and equities), whether listed or not, are specifically

²⁷ That is, capital requirements that are comparable to those applied to banks in this Framework. Implicit in the meaning of the word “comparable” is that the securities firm (but not necessarily its parent) is subject to consolidated regulation and supervision with respect to any downstream affiliates.

excluded from this category. Mortgage loans are excluded to the extent that they qualify for treatment as claims secured by residential property (see paragraph 72).

- Granularity criterion – The supervisor must be satisfied that the regulatory retail portfolio is sufficiently diversified to a degree that reduces the risks in the portfolio, warranting the 75% risk weight. One way of achieving this may be to set a numerical limit that no aggregate exposure to one counterpart²⁸ can exceed 0.2% of the overall regulatory retail portfolio.
- Low value of individual exposures. The maximum aggregated retail exposure to one counterpart cannot exceed an absolute threshold of €1 million.

71. National supervisory authorities should evaluate whether the risk weights in paragraph 69 are considered to be too low based on the default experience for these types of exposures in their jurisdictions. Supervisors, therefore, may require banks to increase these risk weights as appropriate.

8. Claims secured by residential property

72. Lending fully secured by mortgages on residential property that is or will be occupied by the borrower, or that is rented, will be risk weighted at 35%. In applying the 35% weight, the supervisory authorities should satisfy themselves, according to their national arrangements for the provision of housing finance, that this concessionary weight is applied restrictively for residential purposes and in accordance with strict prudential criteria, such as the existence of substantial margin of additional security over the amount of the loan based on strict valuation rules. Supervisors should increase the standard risk weight where they judge the criteria are not met.

73. National supervisory authorities should evaluate whether the risk weights in paragraph 72 are considered to be too low based on the default experience for these types of exposures in their jurisdictions. Supervisors, therefore, may require banks to increase these risk weights as appropriate.

9. Claims secured by commercial real estate

74. In view of the experience in numerous countries that commercial property lending has been a recurring cause of troubled assets in the banking industry over the past few decades, the Committee holds to the view that mortgages on commercial real estate do not, in principle, justify other than a 100% weighting of the loans secured.²⁹

²⁸ Aggregated exposure means gross amount (i.e. not taking any credit risk mitigation into account) of all forms of debt exposures (e.g. loans or commitments) that individually satisfy the three other criteria. In addition, “to one counterpart” means one or several entities that may be considered as a single beneficiary (e.g. in the case of a small business that is affiliated to another small business, the limit would apply to the bank’s aggregated exposure on both businesses).

²⁹ The Committee, however, recognises that, in exceptional circumstances for well-developed and long-established markets, mortgages on office and/or multi-purpose commercial premises and/or multi-tenanted commercial premises may have the potential to receive a preferential risk weight of 50% for the tranche of the loan that does not exceed the lower of 50% of the market value or 60% of the mortgage lending value of the property securing the loan. Any exposure beyond these limits will receive a 100% risk weight. This exceptional treatment will be subject to very strict conditions. In particular, two tests must be fulfilled, namely that (i) losses stemming from commercial real estate lending up to the lower of 50% of the market value or 60% of loan-to-

10. Past due loans

75. The unsecured portion of any loan (other than a qualifying residential mortgage loan) that is past due for more than 90 days, net of specific provisions (including partial write-offs), will be risk-weighted as follows:³⁰

- 150% risk weight when specific provisions are less than 20% of the outstanding amount of the loan;
- 100% risk weight when specific provisions are no less than 20% of the outstanding amount of the loan;
- 100% risk weight when specific provisions are no less than 50% of the outstanding amount of the loan, but with supervisory discretion to reduce the risk weight to 50%.

76. For the purpose of defining the secured portion of the past due loan, eligible collateral and guarantees will be the same as for credit risk mitigation purposes (see Section II.B).³¹ Past due retail loans are to be excluded from the overall regulatory retail portfolio when assessing the granularity criterion specified in paragraph 70, for risk-weighting purposes.

77. In addition to the circumstances described in paragraph 75, where a past due loan is fully secured by those forms of collateral that are not recognised in paragraphs 145 and 146, a 100% risk weight may apply when provisions reach 15% of the outstanding amount of the loan. These forms of collateral are not recognised elsewhere in the standardised approach. Supervisors should set strict operational criteria to ensure the quality of collateral.

78. In the case of qualifying residential mortgage loans, when such loans are past due for more than 90 days they will be risk weighted at 100%, net of specific provisions. If such loans are past due but specific provisions are no less than 20% of their outstanding amount, the risk weight applicable to the remainder of the loan can be reduced to 50% at national discretion.

11. Higher-risk categories

79. The following claims will be risk weighted at 150% or higher:

- Claims on sovereigns, PSEs, banks, and securities firms rated below B-.
- Claims on corporates rated below BB-.
- Past due loans as set out in paragraph 75.

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. This is, if either of these tests is not satisfied in a given year, the eligibility to use this treatment will cease and the original eligibility criteria would need to be satisfied again before it could be applied in the future. Countries applying such a treatment must publicly disclose that these and other additional conditions (that are available from the Basel Committee Secretariat) are met. When claims benefiting from such an exceptional treatment have fallen past due, they will be risk-weighted at 100%.

³⁰ Subject to national discretion, supervisors may permit banks to treat non-past due loans extended to counterparties subject to a 150% risk weight in the same way as past due loans described in paragraphs 75 to 77.

³¹ There will be a transitional period of three years during which a wider range of collateral may be recognised, subject to national discretion.

- Securitisation tranches that are rated between BB+ and BB- will be risk weighted at 350% as set out in paragraph 567.

80. National supervisors may decide to apply a 150% or higher risk weight reflecting the higher risks associated with some other assets, such as venture capital and private equity investments.

12. Other assets

81. The treatment of securitisation exposures is presented separately in Section IV. The standard risk weight for all other assets will be 100%.³² Investments in equity or regulatory capital instruments issued by banks or securities firms will be risk weighted at 100%, unless deducted from the capital base according to Part 1.

13. Off-balance sheet items

82. Off-balance-sheet items under the standardised approach will be converted into credit exposure equivalents through the use of credit conversion factors (CCF). Counterparty risk weightings for OTC derivative transactions will not be subject to any specific ceiling.

83. Commitments with an original maturity up to one year and commitments with an original maturity over one year will receive a CCF of 20% and 50%, respectively. However, any commitments that are unconditionally cancellable at any time by the bank without prior notice, or that effectively provide for automatic cancellation due to deterioration in a borrower's creditworthiness, will receive a 0% CCF.³³

83(i). Direct credit substitutes, e.g. general guarantees of indebtedness (including standby letters of credit serving as financial guarantees for loans and securities) and acceptances (including endorsements with the character of acceptances) will receive a CCF of 100%.

83(ii). Sale and repurchase agreements and asset sales with recourse,³⁴ where the credit risk remains with the bank will receive a CCF of 100%.

84. A CCF of 100% will be applied to the lending of banks' securities or the posting of securities as collateral by banks, including instances where these arise out of repo-style transactions (i.e. repurchase/reverse repurchase and securities lending/securities borrowing transactions). See Section II.D.3 for the calculation of risk-weighted assets where the credit converted exposure is secured by eligible collateral.

84(i). Forward asset purchases, forward deposits and partly-paid shares and securities³⁵, which represent commitments with certain drawdown will receive a CCF of 100%.

³² However, at national discretion, gold bullion held in own vaults or on an allocated basis to the extent backed by bullion liabilities can be treated as cash and therefore risk-weighted at 0%. In addition, cash items in the process of collection can be risk-weighted at 20%.

³³ In certain countries, retail commitments are considered unconditionally cancellable if the terms permit the bank to cancel them to the full extent allowable under consumer protection and related legislation.

³⁴ These items are to be weighted according to the type of asset and not according to the type of counterparty with whom the transaction has been entered into.

84(ii). Certain transaction-related contingent items (e.g. performance bonds, bid bonds, warranties and standby letters of credit related to particular transactions) will receive a CCF of 50%.

84(iii). Note issuance facilities (NIFs) and revolving underwriting facilities (RUFs) will receive a CCF of 50%.

85. For short-term self-liquidating trade letters of credit arising from the movement of goods (e.g. documentary credits collateralised by the underlying shipment), a 20% CCF will be applied to both issuing and confirming banks.

86. Where there is an undertaking to provide a commitment on an off-balance sheet item, banks are to apply the lower of the two applicable CCFs.

87. The credit equivalent amount of OTC derivatives and SFTs that expose a bank to counterparty credit risk is to be calculated under the rules set forth in Annex 4 of this Framework.

88. Banks must closely monitor securities, commodities, and foreign exchange transactions that have failed, starting the first day they fail. A capital charge to failed transactions must be calculated in accordance with Annex 3 of this Framework.

89. With regard to unsettled securities, commodities, and foreign exchange transactions, the Committee is of the opinion that banks are exposed to counterparty credit risk from trade date, irrespective of the booking or the accounting of the transaction. Therefore, banks are encouraged to develop, implement and improve systems for tracking and monitoring the credit risk exposure arising from unsettled transactions as appropriate for producing management information that facilitates action on a timely basis. Furthermore, when such transactions are not processed through a delivery-versus-payment (DvP) or payment-versus-payment (PvP) mechanism, banks must calculate a capital charge as set forth in Annex 3 of this Framework.

B. External credit assessment

1. *The recognition process*

90. National supervisors are responsible for determining whether an external credit assessment institution (ECAI) meets the criteria listed in the paragraph below. The assessments of ECAIs may be recognised on a limited basis, e.g. by type of claims or by jurisdiction. The supervisory process for recognising ECAIs should be made public to avoid unnecessary barriers to entry.

2. *Eligibility criteria*

91. An ECAI must satisfy each of the following six criteria.

- **Objectivity.** The methodology for assigning credit assessments must be rigorous, systematic, and subject to some form of validation based on historical experience.

³⁵ These items are to be weighted according to the type of asset and not according to the type of counterparty with whom the transaction has been entered into.

Moreover, assessments must be subject to ongoing review and responsive to changes in financial condition. Before being recognised by supervisors, an assessment methodology for each market segment, including rigorous backtesting, must have been established for at least one year and preferably three years.

- **Independence:** An ECAI should be independent and should not be subject to political or economic pressures that may influence the rating. The assessment process should be as free as possible from any constraints that could arise in situations where the composition of the board of directors or the shareholder structure of the assessment institution may be seen as creating a conflict of interest.
- **International access/Transparency:** The individual assessments should be available to both domestic and foreign institutions with legitimate interests and at equivalent terms. In addition, the general methodology used by the ECAI should be publicly available.
- **Disclosure:** An ECAI should disclose the following information: its assessment methodologies, including the definition of default, the time horizon, and the meaning of each rating; the actual default rates experienced in each assessment category; and the transitions of the assessments, e.g. the likelihood of AA ratings becoming A over time.
- **Resources:** An ECAI should have sufficient resources to carry out high quality credit assessments. These resources should allow for substantial ongoing contact with senior and operational levels within the entities assessed in order to add value to the credit assessments. Such assessments should be based on methodologies combining qualitative and quantitative approaches.
- **Credibility:** To some extent, credibility is derived from the criteria above. In addition, the reliance on an ECAI's external credit assessments by independent parties (investors, insurers, trading partners) is evidence of the credibility of the assessments of an ECAI. The credibility of an ECAI is also underpinned by the existence of internal procedures to prevent the misuse of confidential information. In order to be eligible for recognition, an ECAI does not have to assess firms in more than one country.

C. Implementation considerations

1. The mapping process

92. Supervisors will be responsible for assigning eligible ECAIs' assessments to the risk weights available under the standardised risk weighting framework, i.e. deciding which assessment categories correspond to which risk weights. The mapping process should be objective and should result in a risk weight assignment consistent with that of the level of credit risk reflected in the tables above. It should cover the full spectrum of risk weights.

93. When conducting such a mapping process, factors that supervisors should assess include, among others, the size and scope of the pool of issuers that each ECAI covers, the range and meaning of the assessments that it assigns, and the definition of default used by the ECAI. In order to promote a more consistent mapping of assessments into the available risk weights and help supervisors in conducting such a process, Annex 2 provides guidance as to how such a mapping process may be conducted.

94. Banks must use the chosen ECAIs and their ratings consistently for each type of claim, for both risk weighting and risk management purposes. Banks will not be allowed to "cherry-pick" the assessments provided by different ECAIs.

95. Banks must disclose ECAIs that they use for the risk weighting of their assets by type of claims, the risk weights associated with the particular rating grades as determined by supervisors through the mapping process as well as the aggregated risk-weighted assets for each risk weight based on the assessments of each eligible ECAI.

2. Multiple assessments

96. If there is only one assessment by an ECAI chosen by a bank for a particular claim, that assessment should be used to determine the risk weight of the claim.

97. If there are two assessments by ECAIs chosen by a bank which map into different risk weights, the higher risk weight will be applied.

98. If there are three or more assessments with different risk weights, the assessments corresponding to the two lowest risk weights should be referred to and the higher of those two risk weights will be applied.

3. Issuer versus issues assessment

99. Where a bank invests in a particular issue that has an issue-specific assessment, the risk weight of the claim will be based on this assessment. Where the bank's claim is not an investment in a specific assessed issue, the following general principles apply.

- In circumstances where the borrower has a specific assessment for an issued debt — but the bank's claim is not an investment in this particular debt — a high quality credit assessment (one which maps into a risk weight lower than that which applies to an unrated claim) on that specific debt may only be applied to the bank's unassessed claim if this claim ranks *pari passu* or senior to the claim with an assessment in all respects. If not, the credit assessment cannot be used and the unassessed claim will receive the risk weight for unrated claims.
- In circumstances where the borrower has an issuer assessment, this assessment typically applies to senior unsecured claims on that issuer. Consequently, only senior claims on that issuer will benefit from a high quality issuer assessment. Other unassessed claims of a highly assessed issuer will be treated as unrated. If either the issuer or a single issue has a low quality assessment (mapping into a risk weight equal to or higher than that which applies to unrated claims), an unassessed claim on the same counterparty will be assigned the same risk weight as is applicable to the low quality assessment.

100. Whether the bank intends to rely on an issuer- or an issue-specific assessment, the assessment must take into account and reflect the entire amount of credit risk exposure the bank has with regard to all payments owed to it.³⁶

101. In order to avoid any double counting of credit enhancement factors, no supervisory recognition of credit risk mitigation techniques will be taken into account if the credit enhancement is already reflected in the issue specific rating (see paragraph 114).

³⁶ For example, if a bank is owed both principal and interest, the assessment must fully take into account and reflect the credit risk associated with repayment of both principal and interest.

4. Domestic currency and foreign currency assessments

102. Where unrated exposures are risk weighted based on the rating of an equivalent exposure to that borrower, the general rule is that foreign currency ratings would be used for exposures in foreign currency. Domestic currency ratings, if separate, would only be used to risk weight claims denominated in the domestic currency.³⁷

5. Short-term/long-term assessments

103. For risk-weighting purposes, short-term assessments are deemed to be issue-specific. They can only be used to derive risk weights for claims arising from the rated facility. They cannot be generalised to other short-term claims, except under the conditions of paragraph 105. In no event can a short-term rating be used to support a risk weight for an unrated long-term claim. Short-term assessments may only be used for short-term claims against banks and corporates. The table below provides a framework for banks' exposures to specific short-term facilities, such as a particular issuance of commercial paper:

Credit assessment	A-1/P-1 ³⁸	A-2/P-2	A-3/P-3	Others ³⁹
Risk weight	20%	50%	100%	150%

104. If a short-term rated facility attracts a 50% risk-weight, unrated short-term claims cannot attract a risk weight lower than 100%. If an issuer has a short-term facility with an assessment that warrants a risk weight of 150%, all unrated claims, whether long-term or short-term, should also receive a 150% risk weight, unless the bank uses recognised credit risk mitigation techniques for such claims.

105. In cases where national supervisors have decided to apply option 2 under the standardised approach to short term interbank claims to banks in their jurisdiction, the interaction with specific short-term assessments is expected to be the following:

- The general preferential treatment for short-term claims, as defined under paragraphs 62 and 64, applies to all claims on banks of up to three months original maturity when there is no specific short-term claim assessment.
- When there is a short-term assessment and such an assessment maps into a risk weight that is more favourable (i.e. lower) or identical to that derived from the general preferential treatment, the short-term assessment should be used for the specific claim only. Other short-term claims would benefit from the general preferential treatment.

³⁷ However, when an exposure arises through a bank's participation in a loan that has been extended, or has been guaranteed against convertibility and transfer risk, by certain MDBs, its convertibility and transfer risk can be considered by national supervisory authorities to be effectively mitigated. To qualify, MDBs must have preferred creditor status recognised in the market and be included in footnote 24. In such cases, for risk weighting purposes, the borrower's domestic currency rating may be used instead of its foreign currency rating. In the case of a guarantee against convertibility and transfer risk, the local currency rating can be used only for the portion that has been guaranteed. The portion of the loan not benefiting from such a guarantee will be risk-weighted based on the foreign currency rating.

³⁸ The notations follow the methodology used by Standard & Poor's and by Moody's Investors Service. The A-1 rating of Standard & Poor's includes both A-1+ and A-1-.

³⁹ This category includes all non-prime and B or C ratings.

- When a specific short-term assessment for a short term claim on a bank maps into a less favourable (higher) risk weight, the general short-term preferential treatment for interbank claims cannot be used. All unrated short-term claims should receive the same risk weighting as that implied by the specific short-term assessment.

106. When a short-term assessment is to be used, the institution making the assessment needs to meet all of the eligibility criteria for recognising ECAs as presented in paragraph 91 in terms of its short-term assessment.

6. Level of application of the assessment

107. External assessments for one entity within a corporate group cannot be used to risk weight other entities within the same group.

7. Unsolicited ratings

108. As a general rule, banks should use *solicited* ratings from eligible ECAs. National supervisory authorities may, however, allow banks to use *unsolicited* ratings in the same way as solicited ratings. However, there may be the potential for ECAs to use unsolicited ratings to put pressure on entities to obtain solicited ratings. Such behaviour, when identified, should cause supervisors to consider whether to continue recognising such ECAs as eligible for capital adequacy purposes.

D. The standardised approach – credit risk mitigation

1. Overarching issues

(i) Introduction

109. Banks use a number of techniques to mitigate the credit risks to which they are exposed. For example, exposures may be collateralised by first priority claims, in whole or in part with cash or securities, a loan exposure may be guaranteed by a third party, or a bank may buy a credit derivative to offset various forms of credit risk. Additionally banks may agree to net loans owed to them against deposits from the same counterparty.

110. Where these techniques meet the requirements for legal certainty as described in paragraph 117 and 118 below, the revised approach to CRM allows a wider range of credit risk mitigants to be recognised for regulatory capital purposes than is permitted under the 1988 Accord.

(ii) General remarks

111. The framework set out in this Section II is applicable to the banking book exposures in the standardised approach. For the treatment of CRM in the IRB approach, see Section III.

112. The comprehensive approach for the treatment of collateral (see paragraphs 130 to 138 and 145 to 181) will also be applied to calculate the counterparty risk charges for OTC derivatives and repo-style transactions booked in the trading book.

113. No transaction in which CRM techniques are used should receive a higher capital requirement than an otherwise identical transaction where such techniques are not used.

114. The effects of CRM will not be double counted. Therefore, no additional supervisory recognition of CRM for regulatory capital purposes will be granted on claims for which an issue-specific rating is used that already reflects that CRM. As stated in paragraph 100 of the

section on the standardised approach, principal-only ratings will also not be allowed within the framework of CRM.

115. While the use of CRM techniques reduces or transfers credit risk, it simultaneously may increase other risks (residual risks). Residual risks include legal, operational, liquidity and market risks. Therefore, it is imperative that banks employ robust procedures and processes to control these risks, including strategy; consideration of the underlying credit; valuation; policies and procedures; systems; control of roll-off risks; and management of concentration risk arising from the bank's use of CRM techniques and its interaction with the bank's overall credit risk profile. Where these risks are not adequately controlled, supervisors may impose additional capital charges or take other supervisory actions as outlined in Pillar 2.

116. The Pillar 3 requirements must also be observed for banks to obtain capital relief in respect of any CRM techniques.

(iii) Legal certainty

117. In order for banks to obtain capital relief for any use of CRM techniques, the following minimum standards for legal documentation must be met.

118. All documentation used in collateralised transactions and for documenting on-balance sheet netting, guarantees and credit derivatives must be binding on all parties and legally enforceable in all relevant jurisdictions. Banks must have conducted sufficient legal review to verify this and have a well founded legal basis to reach this conclusion, and undertake such further review as necessary to ensure continuing enforceability.

2. Overview of Credit Risk Mitigation Techniques⁴⁰

(i) Collateralised transactions

119. A collateralised transaction is one in which:

- banks have a credit exposure or potential credit exposure; and
- that credit exposure or potential credit exposure is hedged in whole or in part by collateral posted by a counterparty⁴¹ or by a third party on behalf of the counterparty.

120. Where banks take eligible financial collateral (e.g. cash or securities, more specifically defined in paragraphs 145 and 146 below), they are allowed to reduce their credit exposure to a counterparty when calculating their capital requirements to take account of the risk mitigating effect of the collateral.

Overall framework and minimum conditions

121. Banks may opt for either the simple approach, which, similar to the 1988 Accord, substitutes the risk weighting of the collateral for the risk weighting of the counterparty for the

⁴⁰ See Annex 10 for an overview of methodologies for the capital treatment of transactions secured by financial collateral under the standardised and IRB approaches.

⁴¹ In this section "counterparty" is used to denote a party to whom a bank has an on- or off-balance sheet credit exposure or a potential credit exposure. That exposure may, for example, take the form of a loan of cash or securities (where the counterparty would traditionally be called the borrower), of securities posted as collateral, of a commitment or of exposure under an OTC derivatives contract.

collateralised portion of the exposure (generally subject to a 20% floor), or for the comprehensive approach, which allows fuller offset of collateral against exposures, by effectively reducing the exposure amount by the value ascribed to the collateral. Banks may operate under either, but not both, approaches in the banking book, but only under the comprehensive approach in the trading book. Partial collateralisation is recognised in both approaches. Mismatches in the maturity of the underlying exposure and the collateral will only be allowed under the comprehensive approach.

122. However, before capital relief will be granted in respect of any form of collateral, the standards set out below in paragraphs 123 to 126 must be met under either approach.

123. In addition to the general requirements for legal certainty set out in paragraphs 117 and 118, the legal mechanism by which collateral is pledged or transferred must ensure that the bank has the right to liquidate or take legal possession of it, in a timely manner, in the event of the default, insolvency or bankruptcy (or one or more otherwise-defined credit events set out in the transaction documentation) of the counterparty (and, where applicable, of the custodian holding the collateral). Furthermore banks must take all steps necessary to fulfil those requirements under the law applicable to the bank's interest in the collateral for obtaining and maintaining an enforceable security interest, e.g. by registering it with a registrar, or for exercising a right to net or set off in relation to title transfer collateral.

124. In order for collateral to provide protection, the credit quality of the counterparty and the value of the collateral must not have a material positive correlation. For example, securities issued by the counterparty – or by any related group entity – would provide little protection and so would be ineligible.

125. Banks must have clear and robust procedures for the timely liquidation of collateral to ensure that any legal conditions required for declaring the default of the counterparty and liquidating the collateral are observed, and that collateral can be liquidated promptly.

126. Where the collateral is held by a custodian, banks must take reasonable steps to ensure that the custodian segregates the collateral from its own assets.

127. A capital requirement will be applied to a bank on either side of the collateralised transaction: for example, both repos and reverse repos will be subject to capital requirements. Likewise, both sides of a securities lending and borrowing transaction will be subject to explicit capital charges, as will the posting of securities in connection with a derivative exposure or other borrowing.

128. Where a bank, acting as an agent, arranges a repo-style transaction (i.e. repurchase/reverse repurchase and securities lending/borrowing transactions) between a customer and a third party and provides a guarantee to the customer that the third party will perform on its obligations, then the risk to the bank is the same as if the bank had entered into the transaction as a principal. In such circumstances, a bank will be required to calculate capital requirements as if it were itself the principal.

The simple approach

129. In the simple approach the risk weighting of the collateral instrument collateralising or partially collateralising the exposure is substituted for the risk weighting of the counterparty. Details of this framework are provided in paragraphs 182 to 185.

The comprehensive approach

130. In the comprehensive approach, when taking collateral, banks will need to calculate their adjusted exposure to a counterparty for capital adequacy purposes in order to take account of the effects of that collateral. Using haircuts, banks are required to adjust both the amount of the exposure to the counterparty and the value of any collateral received in support of that counterparty to take account of possible future fluctuations in the value of either,⁴² occasioned by market movements. This will produce volatility adjusted amounts for both exposure and collateral. Unless either side of the transaction is cash, the volatility adjusted amount for the exposure will be higher than the exposure and for the collateral it will be lower.

131. Additionally where the exposure and collateral are held in different currencies an additional downwards adjustment must be made to the volatility adjusted collateral amount to take account of possible future fluctuations in exchange rates.

132. Where the volatility-adjusted exposure amount is greater than the volatility-adjusted collateral amount (including any further adjustment for foreign exchange risk), banks shall calculate their risk-weighted assets as the difference between the two multiplied by the risk weight of the counterparty. The framework for performing these calculations is set out in paragraphs 147 to 150.

133. In principle, banks have two ways of calculating the haircuts: (i) standard supervisory haircuts, using parameters set by the Committee, and (ii) own-estimate haircuts, using banks' own internal estimates of market price volatility. Supervisors will allow banks to use own-estimate haircuts only when they fulfil certain qualitative and quantitative criteria.

134. A bank may choose to use standard or own-estimate haircuts independently of the choice it has made between the standardised approach and the foundation IRB approach to credit risk. However, if banks seek to use their own-estimate haircuts, they must do so for the full range of instrument types for which they would be eligible to use own-estimates, the exception being immaterial portfolios where they may use the standard supervisory haircuts.

135. The size of the individual haircuts will depend on the type of instrument, type of transaction and the frequency of marking-to-market and remargining. For example, repo-style transactions subject to daily marking-to-market and to daily remargining will receive a haircut based on a 5-business day holding period and secured lending transactions with daily mark-to-market and no remargining clauses will receive a haircut based on a 20-business day holding period. These haircut numbers will be scaled up using the square root of time formula depending on the frequency of remargining or marking-to-market.

136. For certain types of repo-style transactions (broadly speaking government bond repos as defined in paragraphs 170 and 171) supervisors may allow banks using standard supervisory haircuts or own-estimate haircuts not to apply these in calculating the exposure amount after risk mitigation.

137. The effect of master netting agreements covering repo-style transactions can be recognised for the calculation of capital requirements subject to the conditions in paragraph 173.

⁴² Exposure amounts may vary where, for example, securities are being lent.

138. As a further alternative to standard supervisory haircuts and own-estimate haircuts banks may use VaR models for calculating potential price volatility for repo-style transactions and other similar SFTs, as set out in paragraphs 178 to 181 (i) below. Alternatively, subject to supervisory approval, they may also calculate, for these transactions, an expected positive exposure, as set forth in Annex 4 of this Framework.

(ii) On-balance sheet netting

139. Where banks have legally enforceable netting arrangements for loans and deposits they may calculate capital requirements on the basis of net credit exposures subject to the conditions in paragraph 188.

(iii) Guarantees and credit derivatives

140. Where guarantees or credit derivatives are direct, explicit, irrevocable and unconditional, and supervisors are satisfied that banks fulfil certain minimum operational conditions relating to risk management processes they may allow banks to take account of such credit protection in calculating capital requirements.

141. A range of guarantors and protection providers are recognised. As under the 1988 Accord, a substitution approach will be applied. Thus only guarantees issued by or protection provided by entities with a lower risk weight than the counterparty will lead to reduced capital charges since the protected portion of the counterparty exposure is assigned the risk weight of the guarantor or protection provider, whereas the uncovered portion retains the risk weight of the underlying counterparty.

142. Detailed operational requirements are given below in paragraphs 189 to 193.

(iv) Maturity mismatch

143. Where the residual maturity of the CRM is less than that of the underlying credit exposure a maturity mismatch occurs. Where there is a maturity mismatch and the CRM has an original maturity of less than one year, the CRM is not recognised for capital purposes. In other cases where there is a maturity mismatch, partial recognition is given to the CRM for regulatory capital purposes as detailed below in paragraphs 202 to 205. Under the simple approach for collateral maturity mismatches will not be allowed.

(v) Miscellaneous

144. Treatments for pools of credit risk mitigants and first- and second-to-default credit derivatives are given in paragraphs 206 to 210 below.

3. Collateral

(i) Eligible financial collateral

145. The following collateral instruments are eligible for recognition in the simple approach:

-
- (a) Cash (as well as certificates of deposit or comparable instruments issued by the lending bank) on deposit with the bank which is incurring the counterparty exposure.^{43, 44}
-
- (b) Gold.
-
- (c) Debt securities rated by a recognised external credit assessment institution where these are either:
- at least BB- when issued by sovereigns or PSEs that are treated as sovereigns by the national supervisor; or
 - at least BBB- when issued by other entities (including banks and securities firms); or
 - at least A-3/P-3 for short-term debt instruments.
-
- (d) Debt securities not rated by a recognised external credit assessment institution where these are:
- issued by a bank; and
 - listed on a recognised exchange; and
 - classified as senior debt; and
 - all rated issues of the same seniority by the issuing bank must be rated at least BBB- or A-3/P-3 by a recognised external credit assessment institution; and
 - the bank holding the securities as collateral has no information to suggest that the issue justifies a rating below BBB- or A-3/P-3 (as applicable); and
 - the supervisor is sufficiently confident about the market liquidity of the security.
-
- (e) Equities (including convertible bonds) that are included in a main index.
-
- (f) Undertakings for Collective Investments in Transferable Securities (UCITS) and mutual funds where:
- a price for the units is publicly quoted daily; and
 - the UCITS/mutual fund is limited to investing in the instruments listed in this paragraph.⁴⁵
-

146. The following collateral instruments are eligible for recognition in the comprehensive approach:

-
- (a) All of the instruments in paragraph 145;
-
- (b) Equities (including convertible bonds) which are not included in a main index but
-

⁴³ Cash funded credit linked notes issued by the bank against exposures in the banking book which fulfil the criteria for credit derivatives will be treated as cash collateralised transactions.

⁴⁴ When cash on deposit, certificates of deposit or comparable instruments issued by the lending bank are held as collateral at a third-party bank in a non-custodial arrangement, if they are openly pledged/assigned to the lending bank and if the pledge/assignment is unconditional and irrevocable, the exposure amount covered by the collateral (after any necessary haircuts for currency risk) will receive the risk weight of the third-party bank.

⁴⁵ However, the use or potential use by a UCITS/mutual fund of derivative instruments solely to hedge investments listed in this paragraph and paragraph 146 shall not prevent units in that UCITS/mutual fund from being eligible financial collateral.

	which are listed on a recognised exchange;
(c)	UCITS/mutual funds which include such equities.

(ii) *The comprehensive approach*

Calculation of capital requirement

147. For a collateralised transaction, the exposure amount after risk mitigation is calculated as follows:

$$E^* = \max \{0, [E \times (1 + H_e) - C \times (1 - H_c - H_{fx})]\}$$

where:

E^* = the exposure value after risk mitigation

E = current value of the exposure

H_e = haircut appropriate to the exposure

C = the current value of the collateral received

H_c = haircut appropriate to the collateral

H_{fx} = haircut appropriate for currency mismatch between the collateral and exposure

148. The exposure amount after risk mitigation will be multiplied by the risk weight of the counterparty to obtain the risk-weighted asset amount for the collateralised transaction.

149. The treatment for transactions where there is a mismatch between the maturity of the counterparty exposure and the collateral is given in paragraphs 202 to 205.

150. Where the collateral is a basket of assets, the haircut on the basket will be $H = \sum_i a_i H_i$, where a_i is the weight of the asset (as measured by units of currency) in the basket and H_i the haircut applicable to that asset.

Standard supervisory haircuts

151. These are the standard supervisory haircuts (assuming daily mark-to-market, daily remargining and a 10-business day holding period), expressed as percentages:

Issue rating for debt securities	Residual Maturity	Sovereigns ^{46, 47}	Other issuers ⁴⁸
AAA to AA-/A-1	≤ 1 year	0.5	1
	>1 year, ≤ 5 years	2	4
	> 5 years	4	8
A+ to BBB-/A-2/A-3/P-3 and unrated bank securities per para. 145(d)	≤ 1 year	1	2
	>1 year, ≤ 5 years	3	6
	> 5 years	6	12
BB+ to BB-	All	15	
Main index equities (including convertible bonds) and Gold		15	
Other equities (including convertible bonds) listed on a recognised exchange		25	
UCITS/Mutual funds		Highest haircut applicable to any security in which the fund can invest	
Cash in the same currency ⁴⁹		0	

152. The standard supervisory haircut for currency risk where exposure and collateral are denominated in different currencies is 8% (also based on a 10-business day holding period and daily mark-to-market)

153. For transactions in which the bank lends non-eligible instruments (e.g. non-investment grade corporate debt securities), the haircut to be applied on the exposure should be the same as the one for equity traded on a recognised exchange that is not part of a main index.

Own estimates for haircuts

154. Supervisors may permit banks to calculate haircuts using their own internal estimates of market price volatility and foreign exchange volatility. Permission to do so will be conditional on the satisfaction of minimum qualitative and quantitative standards stated in paragraphs 156 to 165. When debt securities are rated BBB-/A-3 or higher, supervisors may allow banks to calculate a volatility estimate for each category of security. In determining relevant categories, institutions must take into account (a) the type of issuer of the security, (b) its rating, (c) its residual maturity, and (d) its modified duration. Volatility estimates must be representative of the securities actually included in the category for that bank. For debt securities rated below BBB-/A-3 or for equities eligible as collateral (lightly shaded boxes in the above table), the haircuts must be calculated for each individual security.

155. Banks must estimate the volatility of the collateral instrument or foreign exchange mismatch individually: estimated volatilities for each transaction must not take into account

⁴⁶ Includes PSEs which are treated as sovereigns by the national supervisor.

⁴⁷ Multilateral development banks receiving a 0% risk weight will be treated as sovereigns.

⁴⁸ Includes PSEs which are not treated as sovereigns by the national supervisor.

⁴⁹ Eligible cash collateral specified in paragraph 145 (a).

the correlations between unsecured exposure, collateral and exchange rates (see paragraphs 202 to 205 for the approach to maturity mismatches).

Quantitative criteria

156. In calculating the haircuts, a 99th percentile, one-tailed confidence interval is to be used.

157. The minimum holding period will be dependent on the type of transaction and the frequency of remargining or marking to market. The minimum holding periods for different types of transactions are presented in paragraph 167. Banks may use haircut numbers calculated according to shorter holding periods, scaled up to the appropriate holding period by the square root of time formula.

158. Banks must take into account the illiquidity of lower-quality assets. The holding period should be adjusted upwards in cases where such a holding period would be inappropriate given the liquidity of the collateral. They should also identify where historical data may understate potential volatility, e.g. a pegged currency. Such cases must be dealt with by subjecting the data to stress testing.

159. The choice of historical observation period (sample period) for calculating haircuts shall be a minimum of one year. For banks that use a weighting scheme or other methods for the historical observation period, the “effective” observation period must be at least one year (that is, the weighted average time lag of the individual observations cannot be less than 6 months).

160. Banks should update their data sets no less frequently than once every three months and should also reassess them whenever market prices are subject to material changes. This implies that haircuts must be computed at least every three months. The supervisor may also require a bank to calculate its haircuts using a shorter observation period if, in the supervisor's judgement, this is justified by a significant upsurge in price volatility.

161. No particular type of model is prescribed. So long as each model used captures all the material risks run by the bank, banks will be free to use models based on, for example, historical simulations and Monte Carlo simulations.

Qualitative criteria

162. The estimated volatility data (and holding period) must be used in the day-to-day risk management process of the bank.

163. Banks should have robust processes in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operation of the risk measurement system.

164. The risk measurement system should be used in conjunction with internal exposure limits.

165. An independent review of the risk measurement system should be carried out regularly in the bank's own internal auditing process. A review of the overall risk management process should take place at regular intervals (ideally not less than once a year) and should specifically address, at a minimum:

- the integration of risk measures into daily risk management;

- the validation of any significant change in the risk measurement process;
- the accuracy and completeness of position data;
- the verification of the consistency, timeliness and reliability of data sources used to run internal models, including the independence of such data sources; and
- the accuracy and appropriateness of volatility assumptions.

Adjustment for different holding periods and non daily mark-to-market or remargining

166. For some transactions, depending on the nature and frequency of the revaluation and remargining provisions, different holding periods are appropriate. The framework for collateral haircuts distinguishes between repo-style transactions (i.e. repo/reverse repos and securities lending/borrowing), “other capital-market-driven transactions” (i.e. OTC derivatives transactions and margin lending) and secured lending. In capital-market-driven transactions and repo-style transactions, the documentation contains remargining clauses; in secured lending transactions, it generally does not.

167. The minimum holding period for various products is summarised in the following table.

Transaction type	Minimum holding period	Condition
Repo-style transaction	five business days	daily remargining
Other capital market transactions	ten business days	daily remargining
Secured lending	twenty business days	daily revaluation

168. When the frequency of remargining or revaluation is longer than the minimum, the minimum haircut numbers will be scaled up depending on the actual number of business days between remargining or revaluation using the square root of time formula below:

$$H = H_M \sqrt{\frac{N_R + (T_M - 1)}{T_M}}$$

where:

H = haircut

H_M = haircut under the minimum holding period

T_M = minimum holding period for the type of transaction

N_R = actual number of business days between remargining for capital market transactions or revaluation for secured transactions.

When a bank calculates the volatility on a T_N day holding period which is different from the specified minimum holding period T_M , the H_M will be calculated using the square root of time formula:

$$H_M = H_N \sqrt{\frac{T_M}{T_N}}$$

T_N = holding period used by the bank for deriving H_N

H_N = haircut based on the holding period T_N

169. For example, for banks using the standard supervisory haircuts, the 10-business day haircuts provided in paragraph 151 will be the basis and this haircut will be scaled up or down depending on the type of transaction and the frequency of remargining or revaluation using the formula below:

$$H = H_{10} \sqrt{\frac{N_R + (T_M - 1)}{10}}$$

where:

H = haircut

H_{10} = 10-business day standard supervisory haircut for instrument

N_R = actual number of business days between remargining for capital market transactions or revaluation for secured transactions.

T_M = minimum holding period for the type of transaction

Conditions for zero H

170. For repo-style transactions where the following conditions are satisfied, and the counterparty is a *core market participant*, supervisors may choose not to apply the haircuts specified in the comprehensive approach and may instead apply a haircut of zero. This carve-out will not be available for banks using the modelling approaches as described in paragraphs 178 to 181 (i).

-
- (a) Both the exposure and the collateral are cash or a sovereign security or PSE security qualifying for a 0% risk weight in the standardised approach;⁵⁰
-
- (b) Both the exposure and the collateral are denominated in the same currency;
-
- (c) Either the transaction is overnight or both the exposure and the collateral are marked-to-market daily and are subject to daily remargining;
-
- (d) Following a counterparty's failure to remargin, the time that is required between the last mark-to-market before the failure to remargin and the liquidation⁵¹ of the collateral is considered to be no more than four business days;
-
- (e) The transaction is settled across a settlement system proven for that type of transaction;
-
- (f) The documentation covering the agreement is standard market documentation for repo-style transactions in the securities concerned;
-
- (g) The transaction is governed by documentation specifying that if the counterparty fails to satisfy an obligation to deliver cash or securities or to deliver margin or
-

⁵⁰ Note that where a supervisor has designated domestic-currency claims on its sovereign or central bank to be eligible for a 0% risk weight in the standardised approach, such claims will satisfy this condition.

⁵¹ This does not require the bank to always liquidate the collateral but rather to have the capability to do so within the given time frame.

otherwise defaults, then the transaction is immediately terminable; and

- (h) Upon any default event, regardless of whether the counterparty is insolvent or bankrupt, the bank has the unfettered, legally enforceable right to immediately seize and liquidate the collateral for its benefit.
-

171. *Core market participants* may include, at the discretion of the national supervisor, the following entities:

-
- (a) Sovereigns, central banks and PSEs;
-
- (b) Banks and securities firms;
-
- (c) Other financial companies (including insurance companies) eligible for a 20% risk weight in the standardised approach;
-
- (d) Regulated mutual funds that are subject to capital or leverage requirements;
-
- (e) Regulated pension funds; and
-
- (f) Recognised clearing organisations.
-

172. Where a supervisor applies a specific carve-out to repo-style transactions in securities issued by its domestic government, then other supervisors may choose to allow banks incorporated in their jurisdiction to adopt the same approach to the same transactions.

Treatment of repo-style transactions covered under master netting agreements

173. The effects of bilateral netting agreements covering repo-style transactions will be recognised on a counterparty-by-counterparty basis if the agreements are legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of whether the counterparty is insolvent or bankrupt. In addition, netting agreements must:

-
- (a) provide the non-defaulting party the right to terminate and close-out in a timely manner all transactions under the agreement upon an event of default, including in the event of insolvency or bankruptcy of the counterparty;
-
- (b) provide for the netting of gains and losses on transactions (including the value of any collateral) terminated and closed out under it so that a single net amount is owed by one party to the other;
-
- (c) allow for the prompt liquidation or setoff of collateral upon the event of default; and
-
- (d) be, together with the rights arising from the provisions required in (a) to (c) above, legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of the counterparty's insolvency or bankruptcy.
-

174. Netting across positions in the banking and trading book will only be recognised when the netted transactions fulfil the following conditions:

(a)	All transactions are marked to market daily; ⁵² and
(b)	The collateral instruments used in the transactions are recognised as eligible financial collateral in the banking book.

175. The formula in paragraph 147 will be adapted to calculate the capital requirements for transactions with netting agreements.

176. For banks using the standard supervisory haircuts or own-estimate haircuts, the framework below will apply to take into account the impact of master netting agreements.

$$E^* = \max \{0, [(\sum(E) - \sum(C)) + \sum (Es \times Hs) + \sum (Efx \times Hfx)]\}^{53}$$

where:

E^* = the exposure value after risk mitigation

E = current value of the exposure

C = the value of the collateral received

Es = absolute value of the net position in a given security

Hs = haircut appropriate to Es

Efx = absolute value of the net position in a currency different from the settlement currency

Hfx = haircut appropriate for currency mismatch

177. The intention here is to obtain a net exposure amount after netting of the exposures and collateral and have an add-on amount reflecting possible price changes for the securities involved in the transactions and for foreign exchange risk if any. The net long or short position of each security included in the netting agreement will be multiplied by the appropriate haircut. All other rules regarding the calculation of haircuts stated in paragraphs 147 to 172 equivalently apply for banks using bilateral netting agreements for repo-style transactions.

Use of models

178. As an alternative to the use of standard or own-estimate haircuts, banks may be permitted to use a VaR models approach to reflect the price volatility of the exposure and collateral for repo-style transactions, taking into account correlation effects between security positions. This approach would apply to repo-style transactions covered by bilateral netting agreements on a counterparty-by-counterparty basis. At the discretion of the national supervisor, firms are also eligible to use the VaR model approach for margin lending transactions, if the transactions are covered under a bilateral master netting agreement that

⁵² The holding period for the haircuts will depend as in other repo-style transactions on the frequency of margining.

⁵³ The starting point for this formula is the formula in paragraph 147 which can also be presented as the following: $E^* = \max \{0, [(E - C) + (E \times He) + (C \times Hc) + (C \times Hfx)]\}$.

meets the requirements of paragraphs 173 and 174. The VaR models approach is available to banks that have received supervisory recognition for an internal market risk model according to paragraph 718 (LXX). Banks which have not received supervisory recognition for use of models according to paragraph 718 (LXX) can separately apply for supervisory recognition to use their internal VaR models for calculation of potential price volatility for repo-style transactions. Internal models will only be accepted when a bank can prove the quality of its model to the supervisor through the backtesting of its output using one year of historical data. Banks must meet the model validation requirement of paragraph 43 of Annex 4 to use VaR for repo-style and other SFTs. In addition, other transactions similar to repo-style transactions (like prime brokerage) and that meet the requirements for repo-style transactions, are also eligible to use the VaR models approach provided the model used meets the operational requirements set forth in Section I.F of Annex 4.

179. The quantitative and qualitative criteria for recognition of internal market risk models for repo-style transactions and other similar transactions are in principle the same as in paragraphs 718 (LXXIV) to 718 (LXXVI). With regard to the holding period, the minimum will be 5-business days for repo-style transactions, rather than the 10-business days in paragraph 718 (LXXVI) (c). For other transactions eligible for the VaR models approach, the 10-business day holding period will be retained. The minimum holding period should be adjusted upwards for market instruments where such a holding period would be inappropriate given the liquidity of the instrument concerned.

180. (Deleted)

181. The calculation of the exposure E^* for banks using their internal model will be the following:

$$E^* = \max \{0, [(\sum E - \sum C) + \text{VaR output from internal model}]\}$$

In calculating capital requirements banks will use the previous business day's VaR number.

181 (i). Subject to supervisory approval, instead of using the VaR approach, banks may also calculate an expected positive exposure for repo-style and other similar SFTs, in accordance with the Internal Model Method set out in Annex 4 of this Framework.

(iii) *The simple approach*

Minimum conditions

182. For collateral to be recognised in the simple approach, the collateral must be pledged for at least the life of the exposure and it must be marked to market and revalued with a minimum frequency of six months. Those portions of claims collateralised by the market value of recognised collateral receive the risk weight applicable to the collateral instrument. The risk weight on the collateralised portion will be subject to a floor of 20% except under the conditions specified in paragraphs 183 to 185. The remainder of the claim should be assigned to the risk weight appropriate to the counterparty. A capital requirement will be applied to banks on either side of the collateralised transaction: for example, both repos and reverse repos will be subject to capital requirements.

Exceptions to the risk weight floor

183. Transactions which fulfil the criteria outlined in paragraph 170 and are with a core market participant, as defined in 171, receive a risk weight of 0%. If the counterparty to the transactions is not a core market participant the transaction should receive a risk weight of 10%.

184. OTC derivative transactions subject to daily mark-to-market, collateralised by cash and where there is no currency mismatch should receive a 0% risk weight. Such transactions collateralised by sovereign or PSE securities qualifying for a 0% risk weight in the standardised approach can receive a 10% risk weight.

185. The 20% floor for the risk weight on a collateralised transaction will not be applied and a 0% risk weight can be applied where the exposure and the collateral are denominated in the same currency, and either:

- the collateral is cash on deposit as defined in paragraph 145 (a); or
- the collateral is in the form of sovereign/PSE securities eligible for a 0% risk weight, and its market value has been discounted by 20%.

(iv) *Collateralised OTC derivatives transactions*

186. Under the Current Exposure Method, the calculation of the counterparty credit risk charge for an individual contract will be as follows:

$$\text{counterparty charge} = [(\text{RC} + \text{add-on}) - C_A] \times r \times 8\%$$

where:

RC = the replacement cost,

add-on = the amount for potential future exposure calculated according to paragraph 92(i) and 92(ii) of Annex 4,

C_A = the volatility adjusted collateral amount under the comprehensive approach prescribed in paragraphs 147 to 172, or zero if no eligible collateral is applied to the transaction, and

r = the risk weight of the counterparty.

187. When effective bilateral netting contracts are in place, RC will be the net replacement cost and the add-on will be A_{Net} as calculated according to paragraphs 96(i) to 96(vi) of Annex 4. The haircut for currency risk (Hfx) should be applied when there is a mismatch between the collateral currency and the settlement currency. Even in the case where there are more than two currencies involved in the exposure, collateral and settlement currency, a single haircut assuming a 10-business day holding period scaled up as necessary depending on the frequency of mark-to-market will be applied.

187(i). As an alternative to the Current Exposure Method for the calculation of the counterparty credit risk charge, banks may also use the Standardised Method and, subject to supervisory approval, the Internal Model Method as set out in Annex 4 of this Framework.

4. On-balance sheet netting

188. Where a bank,

- (a) has a well-founded legal basis for concluding that the netting or offsetting agreement is enforceable in each relevant jurisdiction regardless of whether the counterparty is insolvent or bankrupt;
- (b) is able at any time to determine those assets and liabilities with the same counterparty that are subject to the netting agreement;

- (c) monitors and controls its roll-off risks; and
- (d) monitors and controls the relevant exposures on a net basis,

it may use the net exposure of loans and deposits as the basis for its capital adequacy calculation in accordance with the formula in paragraph 147. Assets (loans) are treated as exposure and liabilities (deposits) as collateral. The haircuts will be zero except when a currency mismatch exists. A 10-business day holding period will apply when daily mark-to-market is conducted and all the requirements contained in paragraphs 151, 169, and 202 to 205 will apply.

5. Guarantees and credit derivatives

(i) Operational requirements

Operational requirements common to guarantees and credit derivatives

189. A guarantee (counter-guarantee) or credit derivative must represent a direct claim on the protection provider and must be explicitly referenced to specific exposures or a pool of exposures, so that the extent of the cover is clearly defined and incontrovertible. Other than non-payment by a protection purchaser of money due in respect of the credit protection contract it must be irrevocable; there must be no clause in the contract that would allow the protection provider unilaterally to cancel the credit cover or that would increase the effective cost of cover as a result of deteriorating credit quality in the hedged exposure.⁵⁴ It must also be unconditional; there should be no clause in the protection contract outside the direct control of the bank that could prevent the protection provider from being obliged to pay out in a timely manner in the event that the original counterparty fails to make the payment(s) due.

Additional operational requirements for guarantees

190. In addition to the legal certainty requirements in paragraphs 117 and 118 above, in order for a guarantee to be recognised, the following conditions must be satisfied:

-
- (a) On the qualifying default/non-payment of the counterparty, the bank may in a timely manner pursue the guarantor for any monies outstanding under the documentation governing the transaction. The guarantor may make one lump sum payment of all monies under such documentation to the bank, or the guarantor may assume the future payment obligations of the counterparty covered by the guarantee. The bank must have the right to receive any such payments from the guarantor without first having to take legal actions in order to pursue the counterparty for payment.
-
- (b) The guarantee is an explicitly documented obligation assumed by the guarantor.
-
- (c) Except as noted in the following sentence, the guarantee covers all types of payments the underlying obligor is expected to make under the documentation governing the transaction, for example notional amount, margin payments etc. Where a guarantee covers payment of principal only, interests and other uncovered payments should be treated as an unsecured amount in accordance with paragraph 198.
-

⁵⁴ Note that the irrevocability condition does not require that the credit protection and the exposure be maturity matched; rather that the maturity agreed *ex ante* may not be reduced *ex post* by the protection provider. Paragraph 203 sets forth the treatment of call options in determining remaining maturity for credit protection.

Additional operational requirements for credit derivatives

191. In order for a credit derivative contract to be recognised, the following conditions must be satisfied:

-
- (a) The credit events specified by the contracting parties must at a minimum cover:
- failure to pay the amounts due under terms of the underlying obligation that are in effect at the time of such failure (with a grace period that is closely in line with the grace period in the underlying obligation);
 - bankruptcy, insolvency or inability of the obligor to pay its debts, or its failure or admission in writing of its inability generally to pay its debts as they become due, and analogous events; and
 - restructuring of the underlying obligation involving forgiveness or postponement of principal, interest or fees that results in a credit loss event (i.e. charge-off, specific provision or other similar debit to the profit and loss account). When restructuring is not specified as a credit event, refer to paragraph 192.
-
- (b) If the credit derivative covers obligations that do not include the underlying obligation, section (g) below governs whether the asset mismatch is permissible.
-
- (c) The credit derivative shall not terminate prior to expiration of any grace period required for a default on the underlying obligation to occur as a result of a failure to pay, subject to the provisions of paragraph 203.
-
- (d) Credit derivatives allowing for cash settlement are recognised for capital purposes insofar as a robust valuation process is in place in order to estimate loss reliably. There must be a clearly specified period for obtaining post-credit-event valuations of the underlying obligation. If the reference obligation specified in the credit derivative for purposes of cash settlement is different than the underlying obligation, section (g) below governs whether the asset mismatch is permissible.
-
- (e) If the protection purchaser's right/ability to transfer the underlying obligation to the protection provider is required for settlement, the terms of the underlying obligation must provide that any required consent to such transfer may not be unreasonably withheld.
-
- (f) The identity of the parties responsible for determining whether a credit event has occurred must be clearly defined. This determination must not be the sole responsibility of the protection seller. The protection buyer must have the right/ability to inform the protection provider of the occurrence of a credit event.
-
- (g) A mismatch between the underlying obligation and the reference obligation under the credit derivative (i.e. the obligation used for purposes of determining cash settlement value or the deliverable obligation) is permissible if (1) the reference obligation ranks *pari passu* with or is junior to the underlying obligation, and (2) the underlying obligation and reference obligation share the same obligor (i.e. the same legal entity) and legally enforceable cross-default or cross-acceleration clauses are in place.
-
- (h) A mismatch between the underlying obligation and the obligation used for purposes of determining whether a credit event has occurred is permissible if (1) the latter obligation ranks *pari passu* with or is junior to the underlying obligation, and (2) the underlying obligation and reference obligation share the same obligor (i.e. the same legal entity) and legally enforceable cross-default or cross-acceleration clauses are in place.
-

192. When the restructuring of the underlying obligation is not covered by the credit derivative, but the other requirements in paragraph 191 are met, partial recognition of the credit derivative will be allowed. If the amount of the credit derivative is less than or equal to the amount of the underlying obligation, 60% of the amount of the hedge can be recognised as covered. If the amount of the credit derivative is larger than that of the underlying obligation, then the amount of eligible hedge is capped at 60% of the amount of the underlying obligation.⁵⁵

193. Only credit default swaps and total return swaps that provide credit protection equivalent to guarantees will be eligible for recognition. The following exception applies. Where a bank buys credit protection through a total return swap and records the net payments received on the swap as net income, but does not record offsetting deterioration in the value of the asset that is protected (either through reductions in fair value or by an addition to reserves), the credit protection will not be recognised. The treatment of first-to-default and second-to-default products is covered separately in paragraphs 207 to 210.

194. Other types of credit derivatives will not be eligible for recognition at this time.⁵⁶

(ii) Range of eligible guarantors (counter-guarantors)/protection providers

195. Credit protection given by the following entities will be recognised:

- sovereign entities,⁵⁷ PSEs, banks⁵⁸ and securities firms with a lower risk weight than the counterparty;
- other entities rated A- or better. This would include credit protection provided by parent, subsidiary and affiliate companies when they have a lower risk weight than the obligor.

(iii) Risk weights

196. The protected portion is assigned the risk weight of the protection provider. The uncovered portion of the exposure is assigned the risk weight of the underlying counterparty.

197. Materiality thresholds on payments below which no payment is made in the event of loss are equivalent to retained first loss positions and must be deducted in full from the capital of the bank purchasing the credit protection.

Proportional cover

198. Where the amount guaranteed, or against which credit protection is held, is less than the amount of the exposure, and the secured and unsecured portions are of equal seniority, i.e. the bank and the guarantor share losses on a pro-rata basis capital relief will be afforded on a proportional basis: i.e. the protected portion of the exposure will receive the

⁵⁵ The 60% recognition factor is provided as an interim treatment, which the Committee intends to refine prior to implementation after considering additional data.

⁵⁶ Cash funded credit linked notes issued by the bank against exposures in the banking book which fulfil the criteria for credit derivatives will be treated as cash collateralised transactions.

⁵⁷ This includes the Bank for International Settlements, the International Monetary Fund, the European Central Bank and the European Community, as well as those MDBs referred to in footnote 24.

⁵⁸ This includes other MDBs.

treatment applicable to eligible guarantees/credit derivatives, with the remainder treated as unsecured.

Tranched cover

199. Where the bank transfers a portion of the risk of an exposure in one or more tranches to a protection seller or sellers and retains some level of risk of the loan and the risk transferred and the risk retained are of different seniority, banks may obtain credit protection for either the senior tranches (e.g. second loss portion) or the junior tranche (e.g. first loss portion). In this case the rules as set out in Section IV (Credit risk – securitisation framework) will apply.

(iv) *Currency mismatches*

200. Where the credit protection is denominated in a currency different from that in which the exposure is denominated — i.e. there is a currency mismatch — the amount of the exposure deemed to be protected will be reduced by the application of a haircut H_{FX} , i.e.

$$G_A = G \times (1 - H_{FX})$$

where:

G = nominal amount of the credit protection

H_{FX} = haircut appropriate for currency mismatch between the credit protection and underlying obligation.

The appropriate haircut based on a 10-business day holding period (assuming daily marking-to-market) will be applied. If a bank uses the supervisory haircuts it will be 8%. The haircuts must be scaled up using the square root of time formula, depending on the frequency of revaluation of the credit protection as described in paragraph 168.

(v) *Sovereign guarantees and counter-guarantees*

201. As specified in paragraph 54, a lower risk weight may be applied at national discretion to a bank's exposures to the sovereign (or central bank) where the bank is incorporated and where the exposure is denominated in domestic currency and funded in that currency. National authorities may extend this treatment to portions of claims guaranteed by the sovereign (or central bank), where the guarantee is denominated in the domestic currency and the exposure is funded in that currency. A claim may be covered by a guarantee that is indirectly counter-guaranteed by a sovereign. Such a claim may be treated as covered by a sovereign guarantee provided that:

-
- (a) the sovereign counter-guarantee covers all credit risk elements of the claim;
-
- (b) both the original guarantee and the counter-guarantee meet all operational requirements for guarantees, except that the counter-guarantee need not be direct and explicit to the original claim; and
-
- (c) the supervisor is satisfied that the cover is robust and that no historical evidence suggests that the coverage of the counter-guarantee is less than effectively equivalent to that of a direct sovereign guarantee.
-

6. Maturity mismatches

202. For the purposes of calculating risk-weighted assets, a maturity mismatch occurs when the residual maturity of a hedge is less than that of the underlying exposure.

(i) Definition of maturity

203. The maturity of the underlying exposure and the maturity of the hedge should both be defined conservatively. The effective maturity of the underlying should be gauged as the longest possible remaining time before the counterparty is scheduled to fulfil its obligation, taking into account any applicable grace period. For the hedge, embedded options which may reduce the term of the hedge should be taken into account so that the shortest possible effective maturity is used. Where a call is at the discretion of the protection seller, the maturity will always be at the first call date. If the call is at the discretion of the protection buying bank but the terms of the arrangement at origination of the hedge contain a positive incentive for the bank to call the transaction before contractual maturity, the remaining time to the first call date will be deemed to be the effective maturity. For example, where there is a step-up in cost in conjunction with a call feature or where the effective cost of cover increases over time even if credit quality remains the same or increases, the effective maturity will be the remaining time to the first call.

(ii) Risk weights for maturity mismatches

204. As outlined in paragraph 143, hedges with maturity mismatches are only recognised when their original maturities are greater than or equal to one year. As a result, the maturity of hedges for exposures with original maturities of less than one year must be matched to be recognised. In all cases, hedges with maturity mismatches will no longer be recognised when they have a residual maturity of three months or less.

205. When there is a maturity mismatch with recognised credit risk mitigants (collateral, on-balance sheet netting, guarantees and credit derivatives) the following adjustment will be applied.

$$Pa = P \times (t - 0.25) / (T - 0.25)$$

where:

Pa = value of the credit protection adjusted for maturity mismatch

P = credit protection (e.g. collateral amount, guarantee amount) adjusted for any haircuts

t = min (T, residual maturity of the credit protection arrangement) expressed in years

T = min (5, residual maturity of the exposure) expressed in years

7. Other items related to the treatment of CRM techniques

(i) Treatment of pools of CRM techniques

206. In the case where a bank has multiple CRM techniques covering a single exposure (e.g. a bank has both collateral and guarantee partially covering an exposure), the bank will be required to subdivide the exposure into portions covered by each type of CRM technique (e.g. portion covered by collateral, portion covered by guarantee) and the risk-weighted assets of each portion must be calculated separately. When credit protection provided by a

single protection provider has differing maturities, they must be subdivided into separate protection as well.

(ii) First-to-default credit derivatives

207. There are cases where a bank obtains credit protection for a basket of reference names and where the first default among the reference names triggers the credit protection and the credit event also terminates the contract. In this case, the bank may recognise regulatory capital relief for the asset within the basket with the lowest risk-weighted amount, but only if the notional amount is less than or equal to the notional amount of the credit derivative.

208. With regard to the bank providing credit protection through such an instrument, if the product has an external credit assessment from an eligible credit assessment institution, the risk weight in paragraph 567 applied to securitisation tranches will be applied. If the product is not rated by an eligible external credit assessment institution, the risk weights of the assets included in the basket will be aggregated up to a maximum of 1250% and multiplied by the nominal amount of the protection provided by the credit derivative to obtain the risk-weighted asset amount.

(iii) Second-to-default credit derivatives

209. In the case where the second default among the assets within the basket triggers the credit protection, the bank obtaining credit protection through such a product will only be able to recognise any capital relief if first-default-protection has also be obtained or when one of the assets within the basket has already defaulted.

210. For banks providing credit protection through such a product, the capital treatment is the same as in paragraph 208 above with one exception. The exception is that, in aggregating the risk weights, the asset with the lowest risk weighted amount can be excluded from the calculation.

III. Credit Risk – The Internal Ratings-Based Approach

A. Overview

211. This section of the Framework describes the IRB approach to credit risk. Subject to certain minimum conditions and disclosure requirements, banks that have received supervisory approval to use the IRB approach may rely on their own internal estimates of risk components in determining the capital requirement for a given exposure. The risk components include measures of the probability of default (PD), loss given default (LGD), the exposure at default (EAD), and effective maturity (M). In some cases, banks may be required to use a supervisory value as opposed to an internal estimate for one or more of the risk components.

212. The IRB approach is based on measures of unexpected losses (UL) and expected losses (EL). The risk-weight functions produce capital requirements for the UL portion. Expected losses are treated separately, as outlined in paragraph 43 and Section III.G.

213. In this section, the asset classes are defined first. Adoption of the IRB approach across all asset classes is also discussed early in this section, as are transitional arrangements. The risk components, each of which is defined later in this section, serve as inputs to the risk-weight functions that have been developed for separate asset classes. For example, there is a risk-weight function for corporate exposures and another one for qualifying revolving retail exposures. The treatment of each asset class begins with a presentation of the relevant risk-weight function(s) followed by the risk components and other relevant factors, such as the treatment of credit risk mitigants. The legal certainty standards for recognising CRM as set out in Section II.D apply for both the foundation and advanced IRB approaches. The minimum requirements that banks must satisfy to use the IRB approach are presented at the end of this section starting at Section III.H, paragraph 387.

B. Mechanics of the IRB approach

214. In Section III.B.1, the risk components (e.g. PD and LGD) and asset classes (e.g. corporate exposures and retail exposures) of the IRB approach are defined. Section 2 provides a description of the risk components to be used by banks by asset class. Sections 3 and 4 discuss a bank's adoption of the IRB approach and transitional arrangements, respectively. In cases where an IRB treatment is not specified, the risk weight for those other exposures is 100%, except when a 0% risk weight applies under the standardised approach, and the resulting risk-weighted assets are assumed to represent UL only.

1. Categorisation of exposures

215. Under the IRB approach, banks must categorise banking-book exposures into broad classes of assets with different underlying risk characteristics, subject to the definitions set out below. The classes of assets are (a) corporate, (b) sovereign, (c) bank, (d) retail, and (e) equity. Within the corporate asset class, five sub-classes of specialised lending are separately identified. Within the retail asset class, three sub-classes are separately identified. Within the corporate and retail asset classes, a distinct treatment for purchased receivables may also apply provided certain conditions are met.

216. The classification of exposures in this way is broadly consistent with established bank practice. However, some banks may use different definitions in their internal risk management and measurement systems. While it is not the intention of the Committee to require banks to change the way in which they manage their business and risks, banks are required to apply the appropriate treatment to each exposure for the purposes of deriving

their minimum capital requirement. Banks must demonstrate to supervisors that their methodology for assigning exposures to different classes is appropriate and consistent over time.

217. For a discussion of the IRB treatment of securitisation exposures, see Section IV.

(i) Definition of corporate exposures

218. In general, a corporate exposure is defined as a debt obligation of a corporation, partnership, or proprietorship. Banks are permitted to distinguish separately exposures to small- and medium-sized entities (SME), as defined in paragraph 273.

219. Within the corporate asset class, five sub-classes of specialised lending (SL) are identified. Such lending possesses all the following characteristics, either in legal form or economic substance:

- The exposure is typically to an entity (often a special purpose entity (SPE)) which was created specifically to finance and/or operate physical assets;
- The borrowing entity has little or no other material assets or activities, and therefore little or no independent capacity to repay the obligation, apart from the income that it receives from the asset(s) being financed;
- The terms of the obligation give the lender a substantial degree of control over the asset(s) and the income that it generates; and
- As a result of the preceding factors, the primary source of repayment of the obligation is the income generated by the asset(s), rather than the independent capacity of a broader commercial enterprise.

220. The five sub-classes of specialised lending are project finance, object finance, commodities finance, income-producing real estate, and high-volatility commercial real estate. Each of these sub-classes is defined below.

Project finance

221. Project finance (PF) is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. This type of financing is usually for large, complex and expensive installations that might include, for example, power plants, chemical processing plants, mines, transportation infrastructure, environment, and telecommunications infrastructure. Project finance may take the form of financing of the construction of a new capital installation, or refinancing of an existing installation, with or without improvements.

222. In such transactions, the lender is usually paid solely or almost exclusively out of the money generated by the contracts for the facility's output, such as the electricity sold by a power plant. The borrower is usually an SPE that is not permitted to perform any function other than developing, owning, and operating the installation. The consequence is that repayment depends primarily on the project's cash flow and on the collateral value of the project's assets. In contrast, if repayment of the exposure depends primarily on a well established, diversified, credit-worthy, contractually obligated end user for repayment, it is considered a secured exposure to that end-user.

Object finance

223. Object finance (OF) refers to a method of funding the acquisition of physical assets (e.g. ships, aircraft, satellites, railcars, and fleets) where the repayment of the exposure is

dependent on the cash flows generated by the specific assets that have been financed and pledged or assigned to the lender. A primary source of these cash flows might be rental or lease contracts with one or several third parties. In contrast, if the exposure is to a borrower whose financial condition and debt-servicing capacity enables it to repay the debt without undue reliance on the specifically pledged assets, the exposure should be treated as a collateralised corporate exposure.

Commodities finance

224. Commodities finance (CF) refers to structured short-term lending to finance reserves, inventories, or receivables of exchange-traded commodities (e.g. crude oil, metals, or crops), where the exposure will be repaid from the proceeds of the sale of the commodity and the borrower has no independent capacity to repay the exposure. This is the case when the borrower has no other activities and no other material assets on its balance sheet. The structured nature of the financing is designed to compensate for the weak credit quality of the borrower. The exposure's rating reflects its self-liquidating nature and the lender's skill in structuring the transaction rather than the credit quality of the borrower.

225. The Committee believes that such lending can be distinguished from exposures financing the reserves, inventories, or receivables of other more diversified corporate borrowers. Banks are able to rate the credit quality of the latter type of borrowers based on their broader ongoing operations. In such cases, the value of the commodity serves as a risk mitigant rather than as the primary source of repayment.

Income-producing real estate

226. Income-producing real estate (IPRE) refers to a method of providing funding to real estate (such as, office buildings to let, retail space, multifamily residential buildings, industrial or warehouse space, and hotels) where the prospects for repayment and recovery on the exposure depend primarily on the cash flows generated by the asset. The primary source of these cash flows would generally be lease or rental payments or the sale of the asset. The borrower may be, but is not required to be, an SPE, an operating company focused on real estate construction or holdings, or an operating company with sources of revenue other than real estate. The distinguishing characteristic of IPRE versus other corporate exposures that are collateralised by real estate is the strong positive correlation between the prospects for repayment of the exposure and the prospects for recovery in the event of default, with both depending primarily on the cash flows generated by a property.

High-volatility commercial real estate

227. High-volatility commercial real estate (HVCRE) lending is the financing of commercial real estate that exhibits higher loss rate volatility (i.e. higher asset correlation) compared to other types of SL. HVCRE includes:

- Commercial real estate exposures secured by properties of types that are categorised by the national supervisor as sharing higher volatilities in portfolio default rates;
- Loans financing any of the land acquisition, development and construction (ADC) phases for properties of those types in such jurisdictions; and
- Loans financing ADC of any other properties where the source of repayment at origination of the exposure is either the future uncertain sale of the property or cash flows whose source of repayment is substantially uncertain (e.g. the property has not yet been leased to the occupancy rate prevailing in that geographic market for that type of commercial real estate), unless the borrower has substantial equity at

risk. Commercial ADC loans exempted from treatment as HVCRE loans on the basis of certainty of repayment of borrower equity are, however, ineligible for the additional reductions for SL exposures described in paragraph 277.

228. Where supervisors categorise certain types of commercial real estate exposures as HVCRE in their jurisdictions, they are required to make public such determinations. Other supervisors need to ensure that such treatment is then applied equally to banks under their supervision when making such HVCRE loans in that jurisdiction.

(ii) *Definition of sovereign exposures*

229. This asset class covers all exposures to counterparties treated as sovereigns under the standardised approach. This includes sovereigns (and their central banks), certain PSEs identified as sovereigns in the standardised approach, MDBs that meet the criteria for a 0% risk weight under the standardised approach, and the entities referred to in paragraph 56.

(iii) *Definition of bank exposures*

230. This asset class covers exposures to banks and those securities firms outlined in paragraph 65. Bank exposures also include claims on domestic PSEs that are treated like claims on banks under the standardised approach, and MDBs that do not meet the criteria for a 0% risk weight under the standardised approach.

(iv) *Definition of retail exposures*

231. An exposure is categorised as a retail exposure if it meets all of the following criteria:

Nature of borrower or low value of individual exposures

- Exposures to individuals — such as revolving credits and lines of credit (e.g. credit cards, overdrafts, and retail facilities secured by financial instruments) as well as personal term loans and leases (e.g. instalment loans, auto loans and leases, student and educational loans, personal finance, and other exposures with similar characteristics) — are generally eligible for retail treatment regardless of exposure size, although supervisors may wish to establish exposure thresholds to distinguish between retail and corporate exposures.
- Residential mortgage loans (including first and subsequent liens, term loans and revolving home equity lines of credit) are eligible for retail treatment regardless of exposure size so long as the credit is extended to an individual that is an owner-occupier of the property (with the understanding that supervisors exercise reasonable flexibility regarding buildings containing only a few rental units — otherwise they are treated as corporate). Loans secured by a single or small number of condominium or co-operative residential housing units in a single building or complex also fall within the scope of the residential mortgage category. National supervisors may set limits on the maximum number of housing units per exposure.
- Loans extended to small businesses and managed as retail exposures are eligible for retail treatment provided the total exposure of the banking group to a small business borrower (on a consolidated basis where applicable) is less than €1 million. Small business loans extended through or guaranteed by an individual are subject to the same exposure threshold.
- It is expected that supervisors provide flexibility in the practical application of such thresholds such that banks are not forced to develop extensive new information systems simply for the purpose of ensuring perfect compliance. It is, however,

important for supervisors to ensure that such flexibility (and the implied acceptance of exposure amounts in excess of the thresholds that are not treated as violations) is not being abused.

Large number of exposures

232. The exposure must be one of a large pool of exposures, which are managed by the bank on a pooled basis. Supervisors may choose to set a minimum number of exposures within a pool for exposures in that pool to be treated as retail.

- Small business exposures below €1 million may be treated as retail exposures if the bank treats such exposures in its internal risk management systems consistently over time and in the same manner as other retail exposures. This requires that such an exposure be originated in a similar manner to other retail exposures. Furthermore, it must not be managed individually in a way comparable to corporate exposures, but rather as part of a portfolio segment or pool of exposures with similar risk characteristics for purposes of risk assessment and quantification. However, this does not preclude retail exposures from being treated individually at some stages of the risk management process. The fact that an exposure is rated individually does not by itself deny the eligibility as a retail exposure.

233. Within the retail asset class category, banks are required to identify separately three sub-classes of exposures: (a) exposures secured by residential properties as defined above, (b) qualifying revolving retail exposures, as defined in the following paragraph, and (c) all other retail exposures.

(v) Definition of qualifying revolving retail exposures

234. All of the following criteria must be satisfied for a sub-portfolio to be treated as a qualifying revolving retail exposure (QRRE). These criteria must be applied at a sub-portfolio level consistent with the bank's segmentation of its retail activities generally. Segmentation at the national or country level (or below) should be the general rule.

- (a) The exposures are revolving, unsecured, and uncommitted (both contractually and in practice). In this context, revolving exposures are defined as those where customers' outstanding balances are permitted to fluctuate based on their decisions to borrow and repay, up to a limit established by the bank.
- (b) The exposures are to individuals.
- (c) The maximum exposure to a single individual in the sub-portfolio is €100,000 or less.
- (d) Because the asset correlation assumptions for the QRRE risk-weight function are markedly below those for the other retail risk-weight function at low PD values, banks must demonstrate that the use of the QRRE risk-weight function is constrained to portfolios that have exhibited low volatility of loss rates, relative to their average level of loss rates, especially within the low PD bands. Supervisors will review the relative volatility of loss rates across the QRRE subportfolios, as well as the aggregate QRRE portfolio, and intend to share information on the typical characteristics of QRRE loss rates across jurisdictions.
- (e) Data on loss rates for the sub-portfolio must be retained in order to allow analysis of the volatility of loss rates.
- (f) The supervisor must concur that treatment as a qualifying revolving retail exposure is consistent with the underlying risk characteristics of the sub-portfolio.

(vi) *Definition of equity exposures*

235. In general, equity exposures are defined on the basis of the economic substance of the instrument. They include both direct and indirect ownership interests,⁵⁹ whether voting or non-voting, in the assets and income of a commercial enterprise or of a financial institution that is not consolidated or deducted pursuant to Part 1 of this Framework.⁶⁰ An instrument is considered to be an equity exposure if it meets all of the following requirements:

- It is irredeemable in the sense that the return of invested funds can be achieved only by the sale of the investment or sale of the rights to the investment or by the liquidation of the issuer;
- It does not embody an obligation on the part of the issuer; and
- It conveys a residual claim on the assets or income of the issuer.

236. Additionally any of the following instruments must be categorised as an equity exposure:

- An instrument with the same structure as those permitted as Tier 1 capital for banking organisations.
- An instrument that embodies an obligation on the part of the issuer and meets any of the following conditions:
 - (1) The issuer may defer indefinitely the settlement of the obligation;
 - (2) The obligation requires (or permits at the issuer's discretion) settlement by issuance of a fixed number of the issuer's equity shares;
 - (3) The obligation requires (or permits at the issuer's discretion) settlement by issuance of a variable number of the issuer's equity shares and (*ceteris paribus*) any change in the value of the obligation is attributable to, comparable to, and in the same direction as, the change in the value of a fixed number of the issuer's equity shares;⁶¹ or,
 - (4) The holder has the option to require that the obligation be settled in equity shares, unless either (i) in the case of a traded instrument, the supervisor is content that the bank has demonstrated that the instrument trades more like the debt of the issuer than like its equity, or (ii) in the case of non-traded instruments, the supervisor is content that the bank has demonstrated that the instrument should be treated as a debt position. In

⁵⁹ Indirect equity interests include holdings of derivative instruments tied to equity interests, and holdings in corporations, partnerships, limited liability companies or other types of enterprises that issue ownership interests and are engaged principally in the business of investing in equity instruments.

⁶⁰ Where some member countries retain their existing treatment as an exception to the deduction approach, such equity investments by IRB banks are to be considered eligible for inclusion in their IRB equity portfolios.

⁶¹ For certain obligations that require or permit settlement by issuance of a variable number of the issuer's equity shares, the change in the monetary value of the obligation is equal to the change in the fair value of a fixed number of equity shares multiplied by a specified factor. Those obligations meet the conditions of item 3 if both the factor and the referenced number of shares are fixed. For example, an issuer may be required to settle an obligation by issuing shares with a value equal to three times the appreciation in the fair value of 1,000 equity shares. That obligation is considered to be the same as an obligation that requires settlement by issuance of shares equal to the appreciation in the fair value of 3,000 equity shares.

cases (i) and (ii), the bank may decompose the risks for regulatory purposes, with the consent of the supervisor.

237. Debt obligations and other securities, partnerships, derivatives or other vehicles structured with the intent of conveying the economic substance of equity ownership are considered an equity holding.⁶² This includes liabilities from which the return is linked to that of equities.⁶³ Conversely, equity investments that are structured with the intent of conveying the economic substance of debt holdings or securitisation exposures would not be considered an equity holding.

238. The national supervisor has the discretion to re-characterise debt holdings as equities for regulatory purposes and to otherwise ensure the proper treatment of holdings under Pillar 2.

(vii) Definition of eligible purchased receivables

239. Eligible purchased receivables are divided into retail and corporate receivables as defined below.

Retail receivables

240. Purchased retail receivables, provided the purchasing bank complies with the IRB rules for retail exposures, are eligible for the top-down approach as permitted within the existing standards for retail exposures. The bank must also apply the minimum operational requirements as set forth in Sections III.F and III.H.

Corporate receivables

241. In general, for purchased corporate receivables, banks are expected to assess the default risk of individual obligors as specified in Section III.C.1 (starting with paragraph 271) consistent with the treatment of other corporate exposures. However, the top-down approach may be used, provided that the purchasing bank's programme for corporate receivables complies with both the criteria for eligible receivables and the minimum operational requirements of this approach. The use of the top-down purchased receivables treatment is limited to situations where it would be an undue burden on a bank to be subjected to the minimum requirements for the IRB approach to corporate exposures that would otherwise apply. Primarily, it is intended for receivables that are purchased for inclusion in asset-backed securitisation structures, but banks may also use this approach, with the approval of national supervisors, for appropriate on-balance sheet exposures that share the same features.

242. Supervisors may deny the use of the top-down approach for purchased corporate receivables depending on the bank's compliance with minimum requirements. In particular, to be eligible for the proposed 'top-down' treatment, purchased corporate receivables must satisfy the following conditions:

⁶² Equities that are recorded as a loan but arise from a debt/equity swap made as part of the orderly realisation or restructuring of the debt are included in the definition of equity holdings. However, these instruments may not attract a lower capital charge than would apply if the holdings remained in the debt portfolio.

⁶³ Supervisors may decide not to require that such liabilities be included where they are directly hedged by an equity holding, such that the net position does not involve material risk.

- The receivables are purchased from unrelated, third party sellers, and as such the bank has not originated the receivables either directly or indirectly.
- The receivables must be generated on an arm's-length basis between the seller and the obligor. (As such, intercompany accounts receivable and receivables subject to contra-accounts between firms that buy and sell to each other are ineligible.⁶⁴)
- The purchasing bank has a claim on all proceeds from the pool of receivables or a *pro-rata* interest in the proceeds.⁶⁵
- National supervisors must also establish concentration limits above which capital charges must be calculated using the minimum requirements for the bottom-up approach for corporate exposures. Such concentration limits may refer to one or a combination of the following measures: the size of one individual exposure relative to the total pool, the size of the pool of receivables as a percentage of regulatory capital, or the maximum size of an individual exposure in the pool.

243. The existence of full or partial recourse to the seller does not automatically disqualify a bank from adopting this top-down approach, as long as the cash flows from the purchased corporate receivables are the primary protection against default risk as determined by the rules in paragraphs 365 to 368 for purchased receivables and the bank meets the eligibility criteria and operational requirements.

2. Foundation and advanced approaches

244. For each of the asset classes covered under the IRB framework, there are three key elements:

- Risk components — estimates of risk parameters provided by banks some of which are supervisory estimates.
- Risk-weight functions — the means by which risk components are transformed into risk-weighted assets and therefore capital requirements.
- Minimum requirements — the minimum standards that must be met in order for a bank to use the IRB approach for a given asset class.

245. For many of the asset classes, the Committee has made available two broad approaches: a foundation and an advanced. Under the foundation approach, as a general rule, banks provide their own estimates of PD and rely on supervisory estimates for other risk components. Under the advanced approach, banks provide more of their own estimates of PD, LGD and EAD, and their own calculation of M, subject to meeting minimum standards. For both the foundation and advanced approaches, banks must always use the risk-weight functions provided in this Framework for the purpose of deriving capital requirements. The full suite of approaches is described below.

⁶⁴ Contra-accounts involve a customer buying from and selling to the same firm. The risk is that debts may be settled through payments in kind rather than cash. Invoices between the companies may be offset against each other instead of being paid. This practice can defeat a security interest when challenged in court.

⁶⁵ Claims on tranches of the proceeds (first loss position, second loss position, etc.) would fall under the securitisation treatment.

(i) *Corporate, sovereign, and bank exposures*

246. Under the foundation approach, banks must provide their own estimates of PD associated with each of their borrower grades, but must use supervisory estimates for the other relevant risk components. The other risk components are LGD, EAD and M.⁶⁶

247. Under the advanced approach, banks must calculate the effective maturity (M)⁶⁷ and provide their own estimates of PD, LGD and EAD.

248. There is an exception to this general rule for the five sub-classes of assets identified as SL.

The SL categories: PF, OF, CF, IPRE, and HVCRE

249. Banks that do not meet the requirements for the estimation of PD under the corporate foundation approach for their SL assets are required to map their internal risk grades to five supervisory categories, each of which is associated with a specific risk weight. This version is termed the 'supervisory slotting criteria approach'.

250. Banks that meet the requirements for the estimation of PD are able to use the foundation approach to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE. At national discretion, banks meeting the requirements for HVCRE exposure are able to use a foundation approach that is similar in all respects to the corporate approach, with the exception of a separate risk-weight function as described in paragraph 283.

251. Banks that meet the requirements for the estimation of PD, LGD and EAD are able to use the advanced approach to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE. At national discretion, banks meeting these requirements for HVCRE exposure are able to use an advanced approach that is similar in all respects to the corporate approach, with the exception of a separate risk-weight function as described in paragraph 283.

(ii) *Retail exposures*

252. For retail exposures, banks must provide their own estimates of PD, LGD and EAD. There is no distinction between a foundation and advanced approach for this asset class.

(iii) *Equity exposures*

253. There are two broad approaches to calculate risk-weighted assets for equity exposures not held in the trading book: a market-based approach and a PD/LGD approach. These are set out in full in paragraphs 340 to 361.

254. The PD/LGD approach to equity exposures remains available for banks that adopt the advanced approach for other exposure types.

⁶⁶ As noted in paragraph 318, some supervisors may require banks using the foundation approach to calculate M using the definition provided in paragraphs 320 to 324.

⁶⁷ At the discretion of the national supervisor, certain domestic exposures may be exempt from the calculation of M (see paragraph 319).

(iv) *Eligible purchased receivables*

255. The treatment potentially straddles two asset classes. For eligible corporate receivables, both a foundation and advanced approach are available subject to certain operational requirements being met. For eligible retail receivables, as with the retail asset class, there is no distinction between a foundation and advanced approach.

3. Adoption of the IRB approach across asset classes

256. Once a bank adopts an IRB approach for part of its holdings, it is expected to extend it across the entire banking group. The Committee recognises however, that, for many banks, it may not be practicable for various reasons to implement the IRB approach across all material asset classes and business units at the same time. Furthermore, once on IRB, data limitations may mean that banks can meet the standards for the use of own estimates of LGD and EAD for some but not all of their asset classes/business units at the same time.

257. As such, supervisors may allow banks to adopt a phased rollout of the IRB approach across the banking group. The phased rollout includes (i) adoption of IRB across asset classes within the same business unit (or in the case of retail exposures across individual sub-classes); (ii) adoption of IRB across business units in the same banking group; and (iii) move from the foundation approach to the advanced approach for certain risk components. However, when a bank adopts an IRB approach for an asset class within a particular business unit (or in the case of retail exposures for an individual sub-class), it must apply the IRB approach to all exposures within that asset class (or sub-class) in that unit.

258. A bank must produce an implementation plan, specifying to what extent and when it intends to roll out IRB approaches across significant asset classes (or sub-classes in the case of retail) and business units over time. The plan should be exacting, yet realistic, and must be agreed with the supervisor. It should be driven by the practicality and feasibility of moving to the more advanced approaches, and not motivated by a desire to adopt a Pillar 1 approach that minimises its capital charge. During the roll-out period, supervisors will ensure that no capital relief is granted for intra-group transactions which are designed to reduce a banking group's aggregate capital charge by transferring credit risk among entities on the standardised approach, foundation and advanced IRB approaches. This includes, but is not limited to, asset sales or cross guarantees.

259. Some exposures in non-significant business units as well as asset classes (or sub-classes in the case of retail) that are immaterial in terms of size and perceived risk profile may be exempt from the requirements in the previous two paragraphs, subject to supervisory approval. Capital requirements for such operations will be determined according to the standardised approach, with the national supervisor determining whether a bank should hold more capital under Pillar 2 for such positions.

260. Notwithstanding the above, once a bank has adopted the IRB approach for all or part of any of the corporate, bank, sovereign, or retail asset classes, it will be required to adopt the IRB approach for its equity exposures at the same time, subject to materiality. Supervisors may require a bank to employ one of the IRB equity approaches if its equity exposures are a significant part of the bank's business, even though the bank may not employ an IRB approach in other business lines. Further, once a bank has adopted the general IRB approach for corporate exposures, it will be required to adopt the IRB approach for the SL sub-classes within the corporate exposure class.

261. Banks adopting an IRB approach are expected to continue to employ an IRB approach. A voluntary return to the standardised or foundation approach is permitted only in

extraordinary circumstances, such as divestiture of a large fraction of the bank's credit-related business, and must be approved by the supervisor.

262. Given the data limitations associated with SL exposures, a bank may remain on the supervisory slotting criteria approach for one or more of the PF, OF, CF, IPRE or HVCRE sub-classes, and move to the foundation or advanced approach for other sub-classes within the corporate asset class. However, a bank should not move to the advanced approach for the HVCRE sub-class without also doing so for material IPRE exposures at the same time.

4. Transition arrangements

(i) Parallel calculation

263. Banks adopting the foundation or advanced approaches are required to calculate their capital requirement using these approaches, as well as the 1988 Accord for the time period specified in paragraphs 45 to 49. Parallel calculation for banks adopting the foundation IRB approach to credit risk will start in the year beginning year-end 2005. Banks moving directly from the 1988 Accord to the advanced approaches to credit and/or operational risk will be subject to parallel calculations or impact studies for the year beginning year-end 2005 and to parallel calculations for the year beginning year-end 2006.

(ii) Corporate, sovereign, bank, and retail exposures

264. The transition period starts on the date of implementation of this Framework and will last for 3 years from that date. During the transition period, the following minimum requirements can be relaxed, subject to discretion of the national supervisor:

- For corporate, sovereign, and bank exposures under the foundation approach, paragraph 463, the requirement that, regardless of the data source, banks must use at least five years of data to estimate the PD; and
- For retail exposures, paragraph 466, the requirement that regardless of the data source banks must use at least five years of data to estimate loss characteristics (EAD, and either expected loss (EL) or PD and LGD).
- For corporate, sovereign, bank, and retail exposures, paragraph 445, the requirement that a bank must demonstrate it has been using a rating system that was broadly in line with the minimum requirements articulated in this document for at least three years prior to qualification.
- The applicable aforementioned transitional arrangements also apply to the PD/LGD approach to equity. There are no transitional arrangements for the market-based approach to equity.

265. Under these transitional arrangements banks are required to have a minimum of two years of data at the implementation of this Framework. This requirement will increase by one year for each of three years of transition.

266. Owing to the potential for very long-run cycles in house prices which short-term data may not adequately capture, during this transition period, LGDs for retail exposures secured by residential properties cannot be set below 10% for any sub-segment of exposures to

which the formula in paragraph 328 is applied.⁶⁸ During the transition period the Committee will review the potential need for continuation of this floor.

(iii) Equity exposures

267. For a maximum of ten years, supervisors may exempt from the IRB treatment particular equity investments held at the time of the publication of this Framework.⁶⁹ The exempted position is measured as the number of shares as of that date and any additional arising directly as a result of owning those holdings, as long as they do not increase the proportional share of ownership in a portfolio company.

268. If an acquisition increases the proportional share of ownership in a specific holding (e.g. due to a change of ownership initiated by the investing company subsequent to the publication of this Framework) the exceeding part of the holding is not subject to the exemption. Nor will the exemption apply to holdings that were originally subject to the exemption, but have been sold and then bought back.

269. Equity holdings covered by these transitional provisions will be subject to the capital requirements of the standardised approach.

C. Rules for corporate, sovereign, and bank exposures

270. Section III.C presents the method of calculating the unexpected loss (UL) capital requirements for corporate, sovereign and bank exposures. As discussed in Section C.1, one risk-weight function is provided for determining the capital requirement for all three asset classes with one exception. Supervisory risk weights are provided for each of the specialised lending sub-classes of corporates, and a separate risk-weight function is also provided for HVCRE. Section C.2 discusses the risk components. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in Section III.G.

1. Risk-weighted assets for corporate, sovereign, and bank exposures

(i) Formula for derivation of risk-weighted assets

271. The derivation of risk-weighted assets is dependent on estimates of the PD, LGD, EAD and, in some cases, effective maturity (M), for a given exposure. Paragraphs 318 to 324 discuss the circumstances in which the maturity adjustment applies.

272. Throughout this section, PD and LGD are measured as decimals, and EAD is measured as currency (e.g. euros), except where explicitly noted otherwise. For exposures not in default, the formula for calculating risk-weighted assets is:^{70, 71}

⁶⁸ The 10% LGD floor shall not apply, however, to sub-segments that are subject to/benefit from sovereign guarantees. Further, the existence of the floor does not imply any waiver of the requirements of LGD estimation as laid out in the minimum requirements starting with paragraph 468.

⁶⁹ This exemption does not apply to investments in entities where some countries will retain the existing risk weighting treatment, as referred to in Part 1, see footnote 9.

⁷⁰ Ln denotes the natural logarithm.

⁷¹ N(x) denotes the cumulative distribution function for a standard normal random variable (i.e. the probability that a normal random variable with mean zero and variance of one is less than or equal to x). G(z) denotes the

$$\text{Correlation (R)} = 0.12 \times (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50)) + 0.24 \times [1 - (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))]$$

$$\text{Maturity adjustment (b)} = (0.11852 - 0.05478 \times \ln(\text{PD}))^2$$

$$\text{Capital requirement}^{72} \text{ (K)} = [\text{LGD} \times \text{N}[(1 - \text{R})^{-0.5} \times \text{G}(\text{PD}) + (\text{R} / (1 - \text{R}))^{0.5} \times \text{G}(0.999)] - \text{PD} \times \text{LGD}] \times (1 - 1.5 \times \text{b})^{-1} \times (1 + (\text{M} - 2.5) \times \text{b})$$

$$\text{Risk-weighted assets (RWA)} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 468) and the bank's best estimate of expected loss (described in paragraph 471). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

Illustrative risk weights are shown in Annex 5.

(ii) *Firm-size adjustment for small- and medium-sized entities (SME)*

273. Under the IRB approach for corporate credits, banks will be permitted to separately distinguish exposures to SME borrowers (defined as corporate exposures where the reported sales for the consolidated group of which the firm is a part is less than €50 million) from those to large firms. A firm-size adjustment (i.e. $0.04 \times (1 - (S - 5) / 45)$) is made to the corporate risk weight formula for exposures to SME borrowers. S is expressed as total annual sales in millions of euros with values of S falling in the range of equal to or less than €50 million or greater than or equal to €5 million. Reported sales of less than €5 million will be treated as if they were equivalent to €5 million for the purposes of the firm-size adjustment for SME borrowers.

$$\text{Correlation (R)} = 0.12 \times (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50)) + 0.24 \times [1 - (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))] - 0.04 \times (1 - (S - 5) / 45)$$

274. Subject to national discretion, supervisors may allow banks, as a failsafe, to substitute total assets of the consolidated group for total sales in calculating the SME threshold and the firm-size adjustment. However, total assets should be used only when total sales are not a meaningful indicator of firm size.

(iii) *Risk weights for specialised lending*

Risk weights for PF, OF, CF, and IPRE

275. Banks that do not meet the requirements for the estimation of PD under the corporate IRB approach will be required to map their internal grades to five supervisory categories, each of which is associated with a specific risk weight. The slotting criteria on which this mapping must be based are provided in Annex 6. The risk weights for unexpected losses associated with each supervisory category are:

inverse cumulative distribution function for a standard normal random variable (i.e. the value of x such that $\text{N}(x) = z$). The normal cumulative distribution function and the inverse of the normal cumulative distribution function are, for example, available in Excel as the functions NORMSDIST and NORMSINV.

⁷² If this calculation results in a negative capital charge for any individual sovereign exposure, banks should apply a zero capital charge for that exposure.

Supervisory categories and UL risk weights for other SL exposures

Strong	Good	Satisfactory	Weak	Default
70%	90%	115%	250%	0%

276. Although banks are expected to map their internal ratings to the supervisory categories for specialised lending using the slotting criteria provided in Annex 6, each supervisory category broadly corresponds to a range of external credit assessments as outlined below.

Strong	Good	Satisfactory	Weak	Default
BBB- or better	BB+ or BB	BB- or B+	B to C-	Not applicable

277. At national discretion, supervisors may allow banks to assign preferential risk weights of 50% to “strong” exposures, and 70% to “good” exposures, provided they have a remaining maturity of less than 2.5 years or the supervisor determines that banks’ underwriting and other risk characteristics are substantially stronger than specified in the slotting criteria for the relevant supervisory risk category.

278. Banks that meet the requirements for the estimation of PD will be able to use the general foundation approach for the corporate asset class to derive risk weights for SL sub-classes.

279. Banks that meet the requirements for the estimation of PD and LGD and/or EAD will be able to use the general advanced approach for the corporate asset class to derive risk weights for SL sub-classes.

Risk weights for HVCRE

280. Banks that do not meet the requirements for estimation of PD, or whose supervisor has chosen not to implement the foundation or advanced approaches to HVCRE, must map their internal grades to five supervisory categories, each of which is associated with a specific risk weight. The slotting criteria on which this mapping must be based are the same as those for IPRE, as provided in Annex 6. The risk weights associated with each category are:

Supervisory categories and UL risk weights for high-volatility commercial real estate

Strong	Good	Satisfactory	Weak	Default
95%	120%	140%	250%	0%

281. As indicated in paragraph 276, each supervisory category broadly corresponds to a range of external credit assessments.

282. At national discretion, supervisors may allow banks to assign preferential risk weights of 70% to “strong” exposures, and 95% to “good” exposures, provided they have a remaining maturity of less than 2.5 years or the supervisor determines that banks’

underwriting and other risk characteristics are substantially stronger than specified in the slotting criteria for the relevant supervisory risk category.

283. Banks that meet the requirements for the estimation of PD and whose supervisor has chosen to implement a foundation or advanced approach to HVCRE exposures will use the same formula for the derivation of risk weights that is used for other SL exposures, except that they will apply the following asset correlation formula:

$$\text{Correlation (R)} = 0.12 \times (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50)) + 0.30 \times [1 - (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))]$$

284. Banks that do not meet the requirements for estimation of LGD and EAD for HVCRE exposures must use the supervisory parameters for LGD and EAD for corporate exposures.

(iv) Calculation of risk-weighted assets for exposures subject to the double default framework

284(i). For hedged exposures to be treated within the scope of the double default framework, capital requirements may be calculated according to paragraphs 284 (ii) and 284 (iii).

284(ii). The capital requirement for a hedged exposure subject to the double default treatment (K_{DD}) is calculated by multiplying K_0 as defined below by a multiplier depending on the PD of the protection provider (PD_g):

$$K_{DD} = K_0 \cdot (0.15 + 160 \cdot PD_g).$$

K_0 is calculated in the same way as a capital requirement for an unhedged corporate exposure (as defined in paragraphs 272 and 273), but using different parameters for LGD and the maturity adjustment.

$$K_0 = LGD_g \cdot \left[N \left(\frac{G(PD_o) + \sqrt{\rho_{os}} \cdot G(0.999)}{\sqrt{1 - \rho_{os}}} \right) - PD_o \right] \cdot \frac{1 + (M - 2.5) \cdot b}{1 - 1.5 \cdot b}$$

PD_o and PD_g are the probabilities of default of the obligor and guarantor, respectively, both subject to the PD floor set out in paragraph 285. The correlation ρ_{os} is calculated according to the formula for correlation (R) in paragraph 272 (or, if applicable, paragraph 273), with PD being equal to PD_o , and LGD_g is the LGD of a comparable direct exposure to the guarantor (i.e. consistent with paragraph 301, the LGD associated with an unhedged facility to the guarantor or the unhedged facility to the obligor, depending upon whether in the event both the guarantor and the obligor default during the life of the hedged transaction available evidence and the structure of the guarantee indicate that the amount recovered would depend on the financial condition of the guarantor or obligor, respectively; in estimating either of these LGDs, a bank may recognise collateral posted exclusively against the exposure or credit protection, respectively, in a manner consistent with paragraphs 303 or 279 and 468 to 473, as applicable). There may be no consideration of double recovery in the LGD estimate. The maturity adjustment coefficient b is calculated according to the formula for maturity adjustment (b) in paragraph 272, with PD being the minimum of PD_o and PD_g . M is the effective maturity of the credit protection, which may under no circumstances be below the one-year floor if the double default framework is to be applied.

284(iii). The risk-weighted asset amount is calculated in the same way as for unhedged exposures, i.e.

$$RWA_{DD} = K_{DD} \cdot 12.5 \cdot EAD_g.$$

2. Risk components

(i) Probability of default (PD)

285. For corporate and bank exposures, the PD is the greater of the one-year PD associated with the internal borrower grade to which that exposure is assigned, or 0.03%. For sovereign exposures, the PD is the one-year PD associated with the internal borrower grade to which that exposure is assigned. The PD of borrowers assigned to a default grade(s), consistent with the reference definition of default, is 100%. The minimum requirements for the derivation of the PD estimates associated with each internal borrower grade are outlined in paragraphs 461 to 463.

(ii) Loss given default (LGD)

286. A bank must provide an estimate of the LGD for each corporate, sovereign and bank exposure. There are two approaches for deriving this estimate: a foundation approach and an advanced approach.

LGD under the foundation approach

Treatment of unsecured claims and non-recognised collateral

287. Under the foundation approach, senior claims on corporates, sovereigns and banks not secured by recognised collateral will be assigned a 45% LGD.

288. All subordinated claims on corporates, sovereigns and banks will be assigned a 75% LGD. A subordinated loan is a facility that is expressly subordinated to another facility. At national discretion, supervisors may choose to employ a wider definition of subordination. This might include economic subordination, such as cases where the facility is unsecured and the bulk of the borrower's assets are used to secure other exposures.

Collateral under the foundation approach

289. In addition to the eligible financial collateral recognised in the standardised approach, under the foundation IRB approach some other forms of collateral, known as eligible IRB collateral, are also recognised. These include receivables, specified commercial and residential real estate (CRE/RRE), and other collateral, where they meet the minimum requirements set out in paragraphs 509 to 524.⁷³ For eligible financial collateral, the requirements are identical to the operational standards as set out in Section II.D beginning with paragraph 111.

⁷³ The Committee, however, recognises that, in exceptional circumstances for well-developed and long-established markets, mortgages on office and/or multi-purpose commercial premises and/or multi-tenanted commercial premises may have the potential to receive alternative recognition as collateral in the corporate portfolio. Please refer to footnote 29 of paragraph 74 for a discussion of the eligibility criteria that would apply. The LGD applied to the collateralised portion of such exposures, subject to the limitations set out in paragraphs 119 to 181 (i) of the standardised approach, will be set at 35%. The LGD applied to the remaining portion of this exposure will be set at 45%. In order to ensure consistency with the capital charges in the standardised approach (while providing a small capital incentive in the IRB approach relative to the standardised approach), supervisors may apply a cap on the capital charge associated with such exposures so as to achieve comparable treatment in both approaches.

Methodology for recognition of eligible financial collateral under the foundation approach

290. The methodology for the recognition of eligible financial collateral closely follows that outlined in the comprehensive approach to collateral in the standardised approach in paragraphs 147 to 181(i). The simple approach to collateral presented in the standardised approach will not be available to banks applying the IRB approach.

291. Following the comprehensive approach, the effective loss given default (LGD*) applicable to a collateralised transaction can be expressed as follows, where:

- LGD is that of the senior unsecured exposure before recognition of collateral (45%);
- E is the current value of the exposure (i.e. cash lent or securities lent or posted);
- E* is the exposure value after risk mitigation as determined in paragraphs 147 to 150 of the standardised approach. This concept is only used to calculate LGD*. Banks must continue to calculate EAD without taking into account the presence of any collateral, unless otherwise specified.

$$\text{LGD}^* = \text{LGD} \times (\text{E}^* / \text{E})$$

292. Banks that qualify for the foundation IRB approach may calculate E* using any of the ways specified under the comprehensive approach for collateralised transactions under the standardised approach.

293. Where repo-style transactions are subject to a master netting agreement, a bank may choose not to recognise the netting effects in calculating capital. Banks that want to recognise the effect of master netting agreements on such transactions for capital purposes must satisfy the criteria provided in paragraph 173 and 174 of the standardised approach. The bank must calculate E* in accordance with paragraphs 176 and 177 or 178 to 181 (i) and equate this to EAD. The impact of collateral on these transactions may not be reflected through an adjustment to LGD.

Carve out from the comprehensive approach

294. As in the standardised approach, for transactions where the conditions in paragraph 170 are met, and in addition, the counterparty is a core market participant as specified in paragraph 171, supervisors may choose not to apply the haircuts specified under the comprehensive approach, but instead to apply a zero H.

Methodology for recognition of eligible IRB collateral

295. The methodology for determining the effective LGD under the foundation approach for cases where banks have taken eligible IRB collateral to secure a corporate exposure is as follows.

- Exposures where the minimum eligibility requirements are met, but the ratio of the current value of the collateral received (C) to the current value of the exposure (E) is below a threshold level of C* (i.e. the required minimum collateralisation level for the exposure) would receive the appropriate LGD for unsecured exposures or those secured by collateral which is not eligible financial collateral or eligible IRB collateral.
- Exposures where the ratio of C to E exceeds a second, higher threshold level of C** (i.e. the required level of over-collateralisation for full LGD recognition) would be assigned an LGD according to the following table.

The following table displays the applicable LGD and required over-collateralisation levels for the secured parts of senior exposures:

Minimum LGD for secured portion of senior exposures

	Minimum LGD	Required minimum collateralisation level of the exposure (C*)	Required level of over-collateralisation for full LGD recognition (C**)
Eligible Financial collateral	0%	0%	n.a.
Receivables	35%	0%	125%
CRE/RRE	35%	30%	140%
Other collateral ⁷⁴	40%	30%	140%

- Senior exposures are to be divided into fully collateralised and uncollateralised portions.
- The part of the exposure considered to be fully collateralised, C/C**, receives the LGD associated with the type of collateral.
- The remaining part of the exposure is regarded as unsecured and receives an LGD of 45%.

Methodology for the treatment of pools of collateral

296. The methodology for determining the effective LGD of a transaction under the foundation approach where banks have taken both financial collateral and other eligible IRB collateral is aligned to the treatment in the standardised approach and based on the following guidance.

- In the case where a bank has obtained multiple forms of CRM, it will be required to subdivide the adjusted value of the exposure (after the haircut for eligible financial collateral) into portions each covered by only one CRM type. That is, the bank must divide the exposure into the portion covered by eligible financial collateral, the portion covered by receivables, the portion covered by CRE/RRE collateral, a portion covered by other collateral, and an unsecured portion, where relevant.
- Where the ratio of the sum of the value of CRE/RRE and other collateral to the reduced exposure (after recognising the effect of eligible financial collateral and receivables collateral) is below the associated threshold level (i.e. the minimum degree of collateralisation of the exposure), the exposure would receive the appropriate unsecured LGD value of 45%.
- The risk-weighted assets for each fully secured portion of exposure must be calculated separately.

⁷⁴ Other collateral excludes physical assets acquired by the bank as a result of a loan default.

LGD under the advanced approach

297. Subject to certain additional minimum requirements specified below, supervisors may permit banks to use their own internal estimates of LGD for corporate, sovereign and bank exposures. LGD must be measured as the loss given default as a percentage of the EAD. Banks eligible for the IRB approach that are unable to meet these additional minimum requirements must utilise the foundation LGD treatment described above.

298. The minimum requirements for the derivation of LGD estimates are outlined in paragraphs 468 to 473.

Treatment of certain repo-style transactions

299. Banks that want to recognise the effects of master netting agreements on repo-style transactions for capital purposes must apply the methodology outlined in paragraph 293 for determining E* for use as the EAD. For banks using the advanced approach, own LGD estimates would be permitted for the unsecured equivalent amount (E*).

Treatment of guarantees and credit derivatives

300. There are two approaches for recognition of CRM in the form of guarantees and credit derivatives in the IRB approach: a foundation approach for banks using supervisory values of LGD, and an advanced approach for those banks using their own internal estimates of LGD.

301. Under either approach, CRM in the form of guarantees and credit derivatives must not reflect the effect of double default (see paragraph 482). As such, to the extent that the CRM is recognised by the bank, the adjusted risk weight will not be less than that of a comparable direct exposure to the protection provider. Consistent with the standardised approach, banks may choose not to recognise credit protection if doing so would result in a higher capital requirement.

Recognition under the foundation approach

302. For banks using the foundation approach for LGD, the approach to guarantees and credit derivatives closely follows the treatment under the standardised approach as specified in paragraphs 189 to 201. The range of eligible guarantors is the same as under the standardised approach except that companies that are internally rated and associated with a PD equivalent to A- or better may also be recognised under the foundation approach. To receive recognition, the requirements outlined in paragraphs 189 to 194 must be met.

303. Eligible guarantees from eligible guarantors will be recognised as follows:

- For the covered portion of the exposure, a risk weight is derived by taking:
 - the risk-weight function appropriate to the type of guarantor, and
 - the PD appropriate to the guarantor's borrower grade, or some grade between the underlying obligor and the guarantor's borrower grade if the bank deems a full substitution treatment not to be warranted.
- The bank may replace the LGD of the underlying transaction with the LGD applicable to the guarantee taking into account seniority and any collateralisation of a guaranteed commitment.

304. The uncovered portion of the exposure is assigned the risk weight associated with the underlying obligor.

305. Where partial coverage exists, or where there is a currency mismatch between the underlying obligation and the credit protection, it is necessary to split the exposure into a covered and an uncovered amount. The treatment in the foundation approach follows that outlined in the standardised approach in paragraphs 198 to 200, and depends upon whether the cover is proportional or tranching.

Recognition under the advanced approach

306. Banks using the advanced approach for estimating LGDs may reflect the risk-mitigating effect of guarantees and credit derivatives through either adjusting PD or LGD estimates. Whether adjustments are done through PD or LGD, they must be done in a consistent manner for a given guarantee or credit derivative type. In doing so, banks must not include the effect of double default in such adjustments. Thus, the adjusted risk weight must not be less than that of a comparable direct exposure to the protection provider.

307. A bank relying on own-estimates of LGD has the option to adopt the treatment outlined above for banks under the foundation IRB approach (paragraphs 302 to 305), or to make an adjustment to its LGD estimate of the exposure to reflect the presence of the guarantee or credit derivative. Under this option, there are no limits to the range of eligible guarantors although the set of minimum requirements provided in paragraphs 483 and 484 concerning the type of guarantee must be satisfied. For credit derivatives, the requirements of paragraphs 488 and 489 must be satisfied.⁷⁵

Operational requirements for recognition of double default

307(i). A bank using an IRB approach has the option of using the substitution approach in determining the appropriate capital requirement for an exposure. However, for exposures hedged by one of the following instruments the double default framework according to paragraphs 284 (i) to 284 (iii) may be applied subject to the additional operational requirements set out in paragraph 307 (ii). A bank may decide separately for each eligible exposure to apply either the double default framework or the substitution approach.

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- | | |
|-------|--|
| (a) | Single-name, unfunded credit derivatives (e.g. credit default swaps) or single-name guarantees. |
| <hr/> | |
| (b) | First-to-default basket products — the double default treatment will be applied to the asset within the basket with the lowest risk-weighted amount. |
| <hr/> | |
| (c) | n^{th} -to-default basket products — the protection obtained is only eligible for consideration under the double default framework if eligible $(n-1)^{\text{th}}$ default protection has also been obtained or where $(n-1)$ of the assets within the basket have already defaulted. |
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⁷⁵ When credit derivatives do not cover the restructuring of the underlying obligation, the partial recognition set out in paragraph 192 applies.

307(ii). The double default framework is only applicable where the following conditions are met.

(a) The risk weight that is associated with the exposure prior to the application of the framework does not already factor in any aspect of the credit protection.

(b) The entity selling credit protection is a bank⁷⁶, investment firm or insurance company (but only those that are in the business of providing credit protection, including mono-lines, re-insurers, and non-sovereign credit export agencies⁷⁷), referred to as a financial firm, that:

- is regulated in a manner broadly equivalent to that in this Framework (where there is appropriate supervisory oversight and transparency/market discipline), or externally rated as at least investment grade by a credit rating agency deemed suitable for this purpose by supervisors;
- had an internal rating with a PD equivalent to or lower than that associated with an external A– rating at the time the credit protection for an exposure was first provided or for any period of time thereafter; and
- has an internal rating with a PD equivalent to or lower than that associated with an external investment-grade rating.

(c) The underlying obligation is:

- a corporate exposure as defined in paragraphs 218 to 228 (excluding specialised lending exposures for which the supervisory slotting criteria approach described in paragraphs 275 to 282 is being used); or
- a claim on a PSE that is not a sovereign exposure as defined in paragraph 229; or
- a loan extended to a small business and classified as a retail exposure as defined in paragraph 231.

(d) The underlying obligor is not:

- a financial firm as defined in (b); or
- a member of the same group as the protection provider.

(e) The credit protection meets the minimum operational requirements for such instruments as outlined in paragraphs 189 to 193.

⁷⁶ This does not include PSEs and MDBs, even though claims on these may be treated as claims on banks according to paragraph 230.

⁷⁷ By non-sovereign it is meant that credit protection in question does not benefit from any explicit sovereign counter-guarantee.

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- (f) In keeping with paragraph 190 for guarantees, for any recognition of double default effects for both guarantees and credit derivatives a bank must have the right and expectation to receive payment from the credit protection provider without having to take legal action in order to pursue the counterparty for payment. To the extent possible, a bank should take steps to satisfy itself that the protection provider is willing to pay promptly if a credit event should occur.
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- (g) The purchased credit protection absorbs all credit losses incurred on the hedged portion of an exposure that arise due to the credit events outlined in the contract.
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- (h) If the payout structure provides for physical settlement, then there must be legal certainty with respect to the deliverability of a loan, bond, or contingent liability. If a bank intends to deliver an obligation other than the underlying exposure, it must ensure that the deliverable obligation is sufficiently liquid so that the bank would have the ability to purchase it for delivery in accordance with the contract.
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- (i) The terms and conditions of credit protection arrangements must be legally confirmed in writing by both the credit protection provider and the bank.
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- (j) In the case of protection against dilution risk, the seller of purchased receivables must not be a member of the same group as the protection provider.
-
- (k) There is no excessive correlation between the creditworthiness of a protection provider and the obligor of the underlying exposure due to their performance being dependent on common factors beyond the systematic risk factor. The bank has a process to detect such excessive correlation. An example of a situation in which such excessive correlation would arise is when a protection provider guarantees the debt of a supplier of goods or services and the supplier derives a high proportion of its income or revenue from the protection provider.
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(iii) *Exposure at default (EAD)*

308. The following sections apply to both on and off-balance sheet positions. All exposures are measured gross of specific provisions or partial write-offs. The EAD on drawn amounts should not be less than the sum of (i) the amount by which a bank's regulatory capital would be reduced if the exposure were written-off fully, and (ii) any specific provisions and partial write-offs. When the difference between the instrument's EAD and the sum of (i) and (ii) is positive, this amount is termed a discount. The calculation of risk-weighted assets is independent of any discounts. Under the limited circumstances described in paragraph 380, discounts may be included in the measurement of total eligible provisions for purposes of the EL-provision calculation set out in Section III.G.

Exposure measurement for on-balance sheet items

309. On-balance sheet netting of loans and deposits will be recognised subject to the same conditions as under the standardised approach (see paragraph 188). Where currency or maturity mismatched on-balance sheet netting exists, the treatment follows the standardised approach, as set out in paragraphs 200 and 202 to 205.

Exposure measurement for off-balance sheet items (with the exception of FX and interest-rate, equity, and commodity-related derivatives)

310. For off-balance sheet items, exposure is calculated as the committed but undrawn amount multiplied by a CCF. There are two approaches for the estimation of CCFs: a foundation approach and an advanced approach.

EAD under the foundation approach

311. The types of instruments and the CCFs applied to them are the same as those in the standardised approach, as outlined in paragraphs 82 to 89 with the exception of commitments, Note Issuance Facilities (NIFs) and Revolving Underwriting Facilities (RUFs).

312. A CCF of 75% will be applied to commitments, NIFs and RUFs regardless of the maturity of the underlying facility. This does not apply to those facilities which are uncommitted, that are unconditionally cancellable, or that effectively provide for automatic cancellation, for example due to deterioration in a borrower's creditworthiness, at any time by the bank without prior notice. A CCF of 0% will be applied to these facilities.

313. The amount to which the CCF is applied is the lower of the value of the unused committed credit line, and the value that reflects any possible constraining availability of the facility, such as the existence of a ceiling on the potential lending amount which is related to a borrower's reported cash flow. If the facility is constrained in this way, the bank must have sufficient line monitoring and management procedures to support this contention.

314. In order to apply a 0% CCF for unconditionally and immediately cancellable corporate overdrafts and other facilities, banks must demonstrate that they actively monitor the financial condition of the borrower, and that their internal control systems are such that they could cancel the facility upon evidence of a deterioration in the credit quality of the borrower.

315. Where a commitment is obtained on another off-balance sheet exposure, banks under the foundation approach are to apply the lower of the applicable CCFs.

EAD under the advanced approach

316. Banks which meet the minimum requirements for use of their own estimates of EAD (see paragraphs 474 to 478) will be allowed to use their own internal estimates of CCFs across different product types provided the exposure is not subject to a CCF of 100% in the foundation approach (see paragraph 311).

Exposure measurement for transactions that expose banks to counterparty credit risk

317. Measures of exposure for SFTs and OTC derivatives that expose banks to counterparty credit risk under the IRB approach will be calculated as per the rules set forth in Annex 4 of this Framework.

(iv) *Effective maturity (M)*

318. For banks using the foundation approach for corporate exposures, effective maturity (M) will be 2.5 years except for repo-style transactions where the effective maturity will be 6 months. National supervisors may choose to require all banks in their jurisdiction (those using the foundation and advanced approaches) to measure M for each facility using the definition provided below.

319. Banks using any element of the advanced IRB approach are required to measure effective maturity for each facility as defined below. However, national supervisors may exempt facilities to certain smaller domestic corporate borrowers from the explicit maturity adjustment if the reported sales (i.e. turnover) as well as total assets for the consolidated group of which the firm is a part of are less than €500 million. The consolidated group has to be a domestic company based in the country where the exemption is applied. If adopted, national supervisors must apply such an exemption to all IRB banks using the advanced approach in that country, rather than on a bank-by-bank basis. If the exemption is applied, all exposures to qualifying smaller domestic firms will be assumed to have an average maturity of 2.5 years, as under the foundation IRB approach.

320. Except as noted in paragraph 321, M is defined as the greater of one year and the remaining effective maturity in years as defined below. In all cases, M will be no greater than 5 years.

- For an instrument subject to a determined cash flow schedule, effective maturity M is defined as:

$$\text{Effective Maturity (M)} = \frac{\sum_t t * CF_t}{\sum_t CF_t}$$

where CF_t denotes the cash flows (principal, interest payments and fees) contractually payable by the borrower in period t.

- If a bank is not in a position to calculate the effective maturity of the contracted payments as noted above, it is allowed to use a more conservative measure of M such as that it equals the maximum remaining time (in years) that the borrower is permitted to take to fully discharge its contractual obligation (principal, interest, and fees) under the terms of loan agreement. Normally, this will correspond to the nominal maturity of the instrument.
- For derivatives subject to a master netting agreement, the weighted average maturity of the transactions should be used when applying the explicit maturity adjustment. Further, the notional amount of each transaction should be used for weighting the maturity.

321. The one-year floor does not apply to certain short-term exposures, comprising fully or nearly-fully collateralised⁷⁸ capital market-driven transactions (i.e. OTC derivatives transactions and margin lending) and repo-style transactions (i.e. repos/reverse repos and securities lending/borrowing) with an original maturity of less than one year, where the documentation contains daily remargining clauses. For all eligible transactions the documentation must require daily revaluation, and must include provisions that must allow for the prompt liquidation or setoff of the collateral in the event of default or failure to re-margin. The maturity of such transactions must be calculated as the greater of one-day, and the effective maturity (M, consistent with the definition above).

322. In addition to the transactions considered in paragraph 321 above, other short-term exposures with an original maturity of less than one year that are not part of a bank's ongoing financing of an obligor may be eligible for exemption from the one-year floor. After a careful review of the particular circumstances in their jurisdictions, national supervisors

⁷⁸ The intention is to include both parties of a transaction meeting these conditions where neither of the parties is systematically under-collateralised.

should define the types of short-term exposures that might be considered eligible for this treatment. The results of these reviews might, for example, include transactions such as:

- Some capital market-driven transactions and repo-style transactions that might not fall within the scope of paragraph 321;
- Some short-term self-liquidating trade transactions. Import and export letters of credit and similar transactions could be accounted for at their actual remaining maturity;
- Some exposures arising from settling securities purchases and sales. This could also include overdrafts arising from failed securities settlements provided that such overdrafts do not continue more than a short, fixed number of business days;
- Some exposures arising from cash settlements by wire transfer, including overdrafts arising from failed transfers provided that such overdrafts do not continue more than a short, fixed number of business days;
- Some exposures to banks arising from foreign exchange settlements; and
- Some short-term loans and deposits.

323. For transactions falling within the scope of paragraph 321 subject to a master netting agreement, the weighted average maturity of the transactions should be used when applying the explicit maturity adjustment. A floor equal to the minimum holding period for the transaction type set out in paragraph 167 will apply to the average. Where more than one transaction type is contained in the master netting agreement a floor equal to the highest holding period will apply to the average. Further, the notional amount of each transaction should be used for weighting maturity.

324. Where there is no explicit adjustment, the effective maturity (M) assigned to all exposures is set at 2.5 years unless otherwise specified in paragraph 318.

Treatment of maturity mismatches

325. The treatment of maturity mismatches under IRB is identical to that in the standardised approach – see paragraphs 202 to 205.

D. Rules for Retail Exposures

326. Section D presents in detail the method of calculating the UL capital requirements for retail exposures. Section D.1 provides three risk-weight functions, one for residential mortgage exposures, a second for qualifying revolving retail exposures, and a third for other retail exposures. Section D.2 presents the risk components to serve as inputs to the risk-weight functions. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in Section III.G.

1. Risk-weighted assets for retail exposures

327. There are three separate risk-weight functions for retail exposures, as defined in paragraphs 328 to 330. Risk weights for retail exposures are based on separate assessments of PD and LGD as inputs to the risk-weight functions. None of the three retail risk-weight functions contains an explicit maturity adjustment. Throughout this section, PD and LGD are measured as decimals, and EAD is measured as currency (e.g. euros).

(i) *Residential mortgage exposures*

328. For exposures defined in paragraph 231 that are not in default and are secured or partly secured⁷⁹ by residential mortgages, risk weights will be assigned based on the following formula:

$$\text{Correlation (R)} = 0.15$$

$$\text{Capital requirement (K)} = \text{LGD} \times \text{N}[(1 - \text{R})^{-0.5} \times \text{G}(\text{PD}) + (\text{R} / (1 - \text{R}))^{0.5} \times \text{G}(0.999)] - \text{PD} \times \text{LGD}$$

$$\text{Risk-weighted assets} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 468) and the bank's best estimate of expected loss (described in paragraph 471). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

(ii) *Qualifying revolving retail exposures*

329. For qualifying revolving retail exposures as defined in paragraph 234 that are not in default, risk weights are defined based on the following formula:

$$\text{Correlation (R)} = 0.04$$

$$\text{Capital requirement (K)} = \text{LGD} \times \text{N}[(1 - \text{R})^{-0.5} \times \text{G}(\text{PD}) + (\text{R} / (1 - \text{R}))^{0.5} \times \text{G}(0.999)] - \text{PD} \times \text{LGD}$$

$$\text{Risk-weighted assets} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 468) and the bank's best estimate of expected loss (described in paragraph 471). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

(iii) *Other retail exposures*

330. For all other retail exposures that are not in default, risk weights are assigned based on the following function, which allows correlation to vary with PD:

$$\text{Correlation (R)} = 0.03 \times (1 - \text{EXP}(-35 \times \text{PD})) / (1 - \text{EXP}(-35)) + 0.16 \times [1 - (1 - \text{EXP}(-35 \times \text{PD})) / (1 - \text{EXP}(-35))]$$

$$\text{Capital requirement (K)} = \text{LGD} \times \text{N}[(1 - \text{R})^{-0.5} \times \text{G}(\text{PD}) + (\text{R} / (1 - \text{R}))^{0.5} \times \text{G}(0.999)] - \text{PD} \times \text{LGD}$$

$$\text{Risk-weighted assets} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 468) and the bank's best estimate of

⁷⁹ This means that risk weights for residential mortgages also apply to the unsecured portion of such residential mortgages.

expected loss (described in paragraph 471). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

Illustrative risk weights are shown in Annex 5.

2. Risk components

(i) Probability of default (PD) and loss given default (LGD)

331. For each identified pool of retail exposures, banks are expected to provide an estimate of the PD and LGD associated with the pool, subject to the minimum requirements as set out in Section III.H. Additionally, the PD for retail exposures is the greater of the one-year PD associated with the internal borrower grade to which the pool of retail exposures is assigned or 0.03%.

(ii) Recognition of guarantees and credit derivatives

332. Banks may reflect the risk-reducing effects of guarantees and credit derivatives, either in support of an individual obligation or a pool of exposures, through an adjustment of either the PD or LGD estimate, subject to the minimum requirements in paragraphs 480 to 489. Whether adjustments are done through PD or LGD, they must be done in a consistent manner for a given guarantee or credit derivative type.

333. Consistent with the requirements outlined above for corporate, sovereign, and bank exposures, banks must not include the effect of double default in such adjustments. The adjusted risk weight must not be less than that of a comparable direct exposure to the protection provider. Consistent with the standardised approach, banks may choose not to recognise credit protection if doing so would result in a higher capital requirement.

(iii) Exposure at default (EAD)

334. Both on and off-balance sheet retail exposures are measured gross of specific provisions or partial write-offs. The EAD on drawn amounts should not be less than the sum of (i) the amount by which a bank's regulatory capital would be reduced if the exposure were written-off fully, and (ii) any specific provisions and partial write-offs. When the difference between the instrument's EAD and the sum of (i) and (ii) is positive, this amount is termed a discount. The calculation of risk-weighted assets is independent of any discounts. Under the limited circumstances described in paragraph 380, discounts may be included in the measurement of total eligible provisions for purposes of the EL-provision calculation set out in Section III.G.

335. On-balance sheet netting of loans and deposits of a bank to or from a retail customer will be permitted subject to the same conditions outlined in paragraph 188 of the standardised approach. For retail off-balance sheet items, banks must use their own estimates of CCFs provided the minimum requirements in paragraphs 474 to 477 and 479 are satisfied.

336. For retail exposures with uncertain future drawdown such as credit cards, banks must take into account their history and/or expectation of additional drawings prior to default in their overall calibration of loss estimates. In particular, where a bank does not reflect conversion factors for undrawn lines in its EAD estimates, it must reflect in its LGD estimates the likelihood of additional drawings prior to default. Conversely, if the bank does not incorporate the possibility of additional drawings in its LGD estimates, it must do so in its EAD estimates.

337. When only the drawn balances of retail facilities have been securitised, banks must ensure that they continue to hold required capital against their share (i.e. seller's interest) of undrawn balances related to the securitised exposures using the IRB approach to credit risk. This means that for such facilities, banks must reflect the impact of CCFs in their EAD estimates rather than in the LGD estimates. For determining the EAD associated with the seller's interest in the undrawn lines, the undrawn balances of securitised exposures would be allocated between the seller's and investors' interests on a pro rata basis, based on the proportions of the seller's and investors' shares of the securitised drawn balances. The investors' share of undrawn balances related to the securitised exposures is subject to the treatment in paragraph 643.

338. To the extent that foreign exchange and interest rate commitments exist within a bank's retail portfolio for IRB purposes, banks are not permitted to provide their internal assessments of credit equivalent amounts. Instead, the rules for the standardised approach continue to apply.

E. Rules for Equity Exposures

339. Section E presents the method of calculating the UL capital requirements for equity exposures. Section E.1 discusses (a) the market-based approach (which is further subdivided into a simple risk weight method and an internal models method), and (b) the PD/LGD approach. The risk components are provided in Section E.2. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in Section III.G.

1. Risk-weighted assets for equity exposures

340. Risk-weighted assets for equity exposures in the trading book are subject to the market risk capital rules.

341. There are two approaches to calculate risk-weighted assets for equity exposures not held in the trading book: a market-based approach and a PD/LGD approach. Supervisors will decide which approach or approaches will be used by banks, and in what circumstances. Certain equity holdings are excluded as defined in paragraphs 356 to 358 and are subject to the capital charges required under the standardised approach.

342. Where supervisors permit both methodologies, banks' choices must be made consistently, and in particular not determined by regulatory arbitrage considerations.

(i) Market-based approach

343. Under the market-based approach, institutions are permitted to calculate the minimum capital requirements for their banking book equity holdings using one or both of two separate and distinct methods: a simple risk weight method or an internal models method. The method used should be consistent with the amount and complexity of the institution's equity holdings and commensurate with the overall size and sophistication of the institution. Supervisors may require the use of either method based on the individual circumstances of an institution.

Simple risk weight method

344. Under the simple risk weight method, a 300% risk weight is to be applied to equity holdings that are publicly traded and a 400% risk weight is to be applied to all other equity

holdings. A publicly traded holding is defined as any equity security traded on a recognised security exchange.

345. Short cash positions and derivative instruments held in the banking book are permitted to offset long positions in the same individual stocks provided that these instruments have been explicitly designated as hedges of specific equity holdings and that they have remaining maturities of at least one year. Other short positions are to be treated as if they are long positions with the relevant risk weight applied to the absolute value of each position. In the context of maturity mismatched positions, the methodology is that for corporate exposures.

Internal models method

346. IRB banks may use, or may be required by their supervisor to use, internal risk measurement models to calculate the risk-based capital requirement. Under this alternative, banks must hold capital equal to the potential loss on the institution's equity holdings as derived using internal value-at-risk models subject to the 99th percentile, one-tailed confidence interval of the difference between quarterly returns and an appropriate risk-free rate computed over a long-term sample period. The capital charge would be incorporated into an institution's risk-based capital ratio through the calculation of risk-weighted equivalent assets.

347. The risk weight used to convert holdings into risk-weighted equivalent assets would be calculated by multiplying the derived capital charge by 12.5 (i.e. the inverse of the minimum 8% risk-based capital requirement). Capital charges calculated under the internal models method may be no less than the capital charges that would be calculated under the simple risk weight method using a 200% risk weight for publicly traded equity holdings and a 300% risk weight for all other equity holdings. These minimum capital charges would be calculated separately using the methodology of the simple risk weight approach. Further, these minimum risk weights are to apply at the individual exposure level rather than at the portfolio level.

348. A bank may be permitted by its supervisor to employ different market-based approaches to different portfolios based on appropriate considerations and where the bank itself uses different approaches internally.

349. Banks are permitted to recognise guarantees but not collateral obtained on an equity position wherein the capital requirement is determined through use of the market-based approach.

(ii) PD/LGD approach

350. The minimum requirements and methodology for the PD/LGD approach for equity exposures (including equity of companies that are included in the retail asset class) are the same as those for the IRB foundation approach for corporate exposures subject to the following specifications:⁸⁰

- The bank's estimate of the PD of a corporate entity in which it holds an equity position must satisfy the same requirements as the bank's estimate of the PD of a

⁸⁰ There is no advanced approach for equity exposures, given the 90% LGD assumption.

corporate entity where the bank holds debt.⁸¹ If a bank does not hold debt of the company in whose equity it has invested, and does not have sufficient information on the position of that company to be able to use the applicable definition of default in practice but meets the other standards, a 1.5 scaling factor will be applied to the risk weights derived from the corporate risk-weight function, given the PD set by the bank. If, however, the bank's equity holdings are material and it is permitted to use a PD/LGD approach for regulatory purposes but the bank has not yet met the relevant standards, the simple risk-weight method under the market-based approach will apply.

- An LGD of 90% would be assumed in deriving the risk weight for equity exposures.
- For these purposes, the risk weight is subject to a five-year maturity adjustment whether or not the bank is using the explicit approach to maturity elsewhere in its IRB portfolio.

351. Under the PD/LGD approach, minimum risk weights as set out in paragraphs 352 and 353 apply. When the sum of UL and EL associated with the equity exposure results in less capital than would be required from application of one of the minimum risk weights, the minimum risk weights must be used. In other words, the minimum risk weights must be applied, if the risk weights calculated according to paragraph 350 plus the EL associated with the equity exposure multiplied by 12.5 are smaller than the applicable minimum risk weights.

352. A minimum risk weight of 100% applies for the following types of equities for as long as the portfolio is managed in the manner outlined below:

- Public equities where the investment is part of a long-term customer relationship, any capital gains are not expected to be realised in the short term and there is no anticipation of (above trend) capital gains in the long term. It is expected that in almost all cases, the institution will have lending and/or general banking relationships with the portfolio company so that the estimated probability of default is readily available. Given their long-term nature, specification of an appropriate holding period for such investments merits careful consideration. In general, it is expected that the bank will hold the equity over the long term (at least five years).
- Private equities where the returns on the investment are based on regular and periodic cash flows not derived from capital gains and there is no expectation of future (above trend) capital gain or of realising any existing gain.

353. For all other equity positions, including net short positions (as defined in paragraph 345), capital charges calculated under the PD/LGD approach may be no less than the capital charges that would be calculated under a simple risk weight method using a 200% risk weight for publicly traded equity holdings and a 300% risk weight for all other equity holdings.

354. The maximum risk weight for the PD/LGD approach for equity exposures is 1250%. This maximum risk weight can be applied, if risk weights calculated according to paragraph 350 plus the EL associated with the equity exposure multiplied by 12.5 exceed the 1250% risk weight. Alternatively, banks may deduct the entire equity exposure amount, assuming it represents the EL amount, 50% from Tier 1 capital and 50% from Tier 2 capital.

⁸¹ In practice, if there is both an equity exposure and an IRB credit exposure to the same counterparty, a default on the credit exposure would thus trigger a simultaneous default for regulatory purposes on the equity exposure.

355. Hedging for PD/LGD equity exposures is, as for corporate exposures, subject to an LGD of 90% on the exposure to the provider of the hedge. For these purposes equity positions will be treated as having a five-year maturity.

(iii) Exclusions to the market-based and PD/LGD approaches

356. Equity holdings in entities whose debt obligations qualify for a zero risk weight under the standardised approach to credit risk can be excluded from the IRB approaches to equity (including those publicly sponsored entities where a zero risk weight can be applied), at the discretion of the national supervisor. If a national supervisor makes such an exclusion this will be available to all banks.

357. To promote specified sectors of the economy, supervisors may exclude from the IRB capital charges equity holdings made under legislated programmes that provide significant subsidies for the investment to the bank and involve some form of government oversight and restrictions on the equity investments. Example of restrictions are limitations on the size and types of businesses in which the bank is investing, allowable amounts of ownership interests, geographical location and other pertinent factors that limit the potential risk of the investment to the bank. Equity holdings made under legislated programmes can only be excluded from the IRB approaches up to an aggregate of 10% of Tier 1 plus Tier 2 capital.

358. Supervisors may also exclude the equity exposures of a bank from the IRB treatment based on materiality. The equity exposures of a bank are considered material if their aggregate value, excluding all legislative programmes discussed in paragraph 357, exceeds, on average over the prior year, 10% of bank's Tier 1 plus Tier 2 capital. This materiality threshold is lowered to 5% of a bank's Tier 1 plus Tier 2 capital if the equity portfolio consists of less than 10 individual holdings. National supervisors may use lower materiality thresholds.

2. Risk components

359. In general, the measure of an equity exposure on which capital requirements is based is the value presented in the financial statements, which depending on national accounting and regulatory practices may include unrealised revaluation gains. Thus, for example, equity exposure measures will be:

- For investments held at fair value with changes in value flowing directly through income and into regulatory capital, exposure is equal to the fair value presented in the balance sheet.
- For investments held at fair value with changes in value not flowing through income but into a tax-adjusted separate component of equity, exposure is equal to the fair value presented in the balance sheet.
- For investments held at cost or at the lower of cost or market, exposure is equal to the cost or market value presented in the balance sheet.⁸²

360. Holdings in funds containing both equity investments and other non-equity types of investments can be either treated, in a consistent manner, as a single investment based on

⁸² This does not affect the existing allowance of 45% of unrealised gains to Tier 2 capital in the 1988 Accord.

the majority of the fund's holdings or, where possible, as separate and distinct investments in the fund's component holdings based on a look-through approach.

361. Where only the investment mandate of the fund is known, the fund can still be treated as a single investment. For this purpose, it is assumed that the fund first invests, to the maximum extent allowed under its mandate, in the asset classes attracting the highest capital requirement, and then continues making investments in descending order until the maximum total investment level is reached. The same approach can also be used for the look-through approach, but only where the bank has rated all the potential constituents of such a fund.

F. Rules for Purchased Receivables

362. Section F presents the method of calculating the UL capital requirements for purchased receivables. For such assets, there are IRB capital charges for both default risk and dilution risk. Section III.F.1 discusses the calculation of risk-weighted assets for default risk. The calculation of risk-weighted assets for dilution risk is provided in Section III.F.2. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in Section III.G.

1. Risk-weighted assets for default risk

363. For receivables belonging unambiguously to one asset class, the IRB risk weight for default risk is based on the risk-weight function applicable to that particular exposure type, as long as the bank can meet the qualification standards for this particular risk-weight function. For example, if banks cannot comply with the standards for qualifying revolving retail exposures (defined in paragraph 234), they should use the risk-weight function for other retail exposures. For hybrid pools containing mixtures of exposure types, if the purchasing bank cannot separate the exposures by type, the risk-weight function producing the highest capital requirements for the exposure types in the receivable pool applies.

(i) Purchased retail receivables

364. For purchased retail receivables, a bank must meet the risk quantification standards for retail exposures but can utilise external and internal reference data to estimate the PDs and LGDs. The estimates for PD and LGD (or EL) must be calculated for the receivables on a stand-alone basis; that is, without regard to any assumption of recourse or guarantees from the seller or other parties.

(ii) Purchased corporate receivables

365. For purchased corporate receivables the purchasing bank is expected to apply the existing IRB risk quantification standards for the bottom-up approach. However, for eligible purchased corporate receivables, and subject to supervisory permission, a bank may employ the following top-down procedure for calculating IRB risk weights for default risk:

- The purchasing bank will estimate the pool's one-year EL for default risk, expressed in percentage of the exposure amount (i.e. the total EAD amount to the bank by all obligors in the receivables pool). The estimated EL must be calculated for the receivables on a stand-alone basis; that is, without regard to any assumption of

recourse or guarantees from the seller or other parties. The treatment of recourse or guarantees covering default risk (and/or dilution risk) is discussed separately below.

- Given the EL estimate for the pool's default losses, the risk weight for default risk is determined by the risk-weight function for corporate exposures.⁸³ As described below, the precise calculation of risk weights for default risk depends on the bank's ability to decompose EL into its PD and LGD components in a reliable manner. Banks can utilise external and internal data to estimate PDs and LGDs. However, the advanced approach will not be available for banks that use the foundation approach for corporate exposures.

Foundation IRB treatment

366. If the purchasing bank is unable to decompose EL into its PD and LGD components in a reliable manner, the risk weight is determined from the corporate risk-weight function using the following specifications: if the bank can demonstrate that the exposures are exclusively senior claims to corporate borrowers, an LGD of 45% can be used. PD will be calculated by dividing the EL using this LGD. EAD will be calculated as the outstanding amount minus the capital charge for dilution prior to credit risk mitigation (K_{Dilution}). Otherwise, PD is the bank's estimate of EL; LGD will be 100%; and EAD is the amount outstanding minus K_{Dilution} . EAD for a revolving purchase facility is the sum of the current amount of receivables purchased plus 75% of any undrawn purchase commitments minus K_{Dilution} . If the purchasing bank is able to estimate PD in a reliable manner, the risk weight is determined from the corporate risk-weight functions according to the specifications for LGD, M and the treatment of guarantees under the foundation approach as given in paragraphs 287 to 296, 299, 300 to 305, and 318.

Advanced IRB treatment

367. If the purchasing bank can estimate either the pool's default-weighted average loss rates given default (as defined in paragraph 468) or average PD in a reliable manner, the bank may estimate the other parameter based on an estimate of the expected long-run loss rate. The bank may (i) use an appropriate PD estimate to infer the long-run default-weighted average loss rate given default, or (ii) use a long-run default-weighted average loss rate given default to infer the appropriate PD. In either case, it is important to recognise that the LGD used for the IRB capital calculation for purchased receivables cannot be less than the long-run default-weighted average loss rate given default and must be consistent with the concepts defined in paragraph 468. The risk weight for the purchased receivables will be determined using the bank's estimated PD and LGD as inputs to the corporate risk-weight function. Similar to the foundation IRB treatment, EAD will be the amount outstanding minus K_{Dilution} . EAD for a revolving purchase facility will be the sum of the current amount of receivables purchased plus 75% of any undrawn purchase commitments minus K_{Dilution} (thus, banks using the advanced IRB approach will not be permitted to use their internal EAD estimates for undrawn purchase commitments).

368. For drawn amounts, M will equal the pool's exposure-weighted average effective maturity (as defined in paragraphs 320 to 324). This same value of M will also be used for undrawn amounts under a committed purchase facility provided the facility contains effective covenants, early amortisation triggers, or other features that protect the purchasing bank

⁸³ The firm-size adjustment for SME, as defined in paragraph 273, will be the weighted average by individual exposure of the pool of purchased corporate receivables. If the bank does not have the information to calculate the average size of the pool, the firm-size adjustment will not apply.

against a significant deterioration in the quality of the future receivables it is required to purchase over the facility's term. Absent such effective protections, the M for undrawn amounts will be calculated as the sum of (a) the longest-dated potential receivable under the purchase agreement and (b) the remaining maturity of the purchase facility.

2. Risk-weighted assets for dilution risk

369. Dilution refers to the possibility that the receivable amount is reduced through cash or non-cash credits to the receivable's obligor.⁸⁴ For both corporate and retail receivables, unless the bank can demonstrate to its supervisor that the dilution risk for the purchasing bank is immaterial, the treatment of dilution risk must be the following: at the level of either the pool as a whole (top-down approach) or the individual receivables making up the pool (bottom-up approach), the purchasing bank will estimate the one-year EL for dilution risk, also expressed in percentage of the receivables amount. Banks can utilise external and internal data to estimate EL. As with the treatments of default risk, this estimate must be computed on a stand-alone basis; that is, under the assumption of no recourse or other support from the seller or third-party guarantors. For the purpose of calculating risk weights for dilution risk, the corporate risk-weight function must be used with the following settings: the PD must be set equal to the estimated EL, and the LGD must be set at 100%. An appropriate maturity treatment applies when determining the capital requirement for dilution risk. If a bank can demonstrate that the dilution risk is appropriately monitored and managed to be resolved within one year, the supervisor may allow the bank to apply a one-year maturity.

370. This treatment will be applied regardless of whether the underlying receivables are corporate or retail exposures, and regardless of whether the risk weights for default risk are computed using the standard IRB treatments or, for corporate receivables, the top-down treatment described above.

3. Treatment of purchase price discounts for receivables

371. In many cases, the purchase price of receivables will reflect a discount (not to be confused with the discount concept defined in paragraphs 308 and 334) that provides first loss protection for default losses, dilution losses or both (see paragraph 629). To the extent a portion of such a purchase price discount will be refunded to the seller, this refundable amount may be treated as first loss protection under the IRB securitisation framework. Non-refundable purchase price discounts for receivables do not affect either the EL-provision calculation in Section III.G or the calculation of risk-weighted assets.

372. When collateral or partial guarantees obtained on receivables provide first loss protection (collectively referred to as mitigants in this paragraph), and these mitigants cover default losses, dilution losses, or both, they may also be treated as first loss protection under the IRB securitisation framework (see paragraph 629). When the same mitigant covers both default and dilution risk, banks using the Supervisory Formula that are able to calculate an exposure-weighted LGD must do so as defined in paragraph 634.

⁸⁴ Examples include offsets or allowances arising from returns of goods sold, disputes regarding product quality, possible debts of the borrower to a receivables obligor, and any payment or promotional discounts offered by the borrower (e.g. a credit for cash payments within 30 days).

4. Recognition of credit risk mitigants

373. Credit risk mitigants will be recognised generally using the same type of framework as set forth in paragraphs 300 to 307.⁸⁵ In particular, a guarantee provided by the seller or a third party will be treated using the existing IRB rules for guarantees, regardless of whether the guarantee covers default risk, dilution risk, or both.

- If the guarantee covers both the pool's default risk *and* dilution risk, the bank will substitute the risk weight for an exposure to the guarantor in place of the pool's total risk weight for default and dilution risk.
- If the guarantee covers only default risk or dilution risk, but not both, the bank will substitute the risk weight for an exposure to the guarantor in place of the pool's risk weight for the corresponding risk component (default or dilution). The capital requirement for the other component will then be added.
- If a guarantee covers only a portion of the default and/or dilution risk, the uncovered portion of the default and/or dilution risk will be treated as per the existing CRM rules for proportional or tranching coverage (i.e. the risk weights of the uncovered risk components will be added to the risk weights of the covered risk components).

373 (i). If protection against dilution risk has been purchased, and the conditions of paragraphs 307 (i) and 307 (ii) are met, the double default framework may be used for the calculation of the risk-weighted asset amount for dilution risk. In this case, paragraphs 284 (i) to 284 (iii) apply with PD_o being equal to the estimated EL, LGD_g being equal to 100 percent, and effective maturity being set according to paragraph 369.

G. Treatment of Expected Losses and Recognition of Provisions

374. Section III.G discusses the method by which the difference between provisions (e.g. specific provisions, portfolio-specific general provisions such as country risk provisions or general provisions) and expected losses may be included in or must be deducted from regulatory capital, as outlined in paragraph 43.

1. Calculation of expected losses

375. A bank must sum the EL amount (defined as EL multiplied by EAD) associated with its exposures (excluding the EL amount associated with equity exposures under the PD/LGD approach and securitisation exposures) to obtain a total EL amount. While the EL amount associated with equity exposures subject to the PD/LGD approach is excluded from the total EL amount, paragraphs 376 and 386 apply to such exposures. The treatment of EL for securitisation exposures is described in paragraph 563.

(i) Expected loss for exposures other than SL subject to the supervisory slotting criteria

376. Banks must calculate an EL as $PD \times LGD$ for corporate, sovereign, bank, and retail exposures both not in default and not treated as hedged exposures under the double default treatment. For corporate, sovereign, bank, and retail exposures that are in default, banks must use their best estimate of expected loss as defined in paragraph 471 and banks on the foundation approach must use the supervisory LGD. For SL exposures subject to the

⁸⁵ At national supervisory discretion, banks may recognise guarantors that are internally rated and associated with a PD equivalent to less than A- under the foundation IRB approach for purposes of determining capital requirements for dilution risk.

supervisory slotting criteria EL is calculated as described in paragraphs 377 and 378. For equity exposures subject to the PD/LGD approach, the EL is calculated as PD x LGD unless paragraphs 351 to 354 apply. Securitisation exposures do not contribute to the EL amount, as set out in paragraph 563. For all other exposures, including hedged exposures under the double default treatment, the EL is zero.

(ii) *Expected loss for SL exposures subject to the supervisory slotting criteria*

377. For SL exposures subject to the supervisory slotting criteria, the EL amount is determined by multiplying 8% by the risk-weighted assets produced from the appropriate risk weights, as specified below, multiplied by EAD.

Supervisory categories and EL risk weights for other SL exposures

378. The risk weights for SL, other than HVCRE, are as follows:

Strong	Good	Satisfactory	Weak	Default
5%	10%	35%	100%	625%

Where, at national discretion, supervisors allow banks to assign preferential risk weights to other SL exposures falling into the “strong” and “good” supervisory categories as outlined in paragraph 277, the corresponding EL risk weight is 0% for “strong” exposures, and 5% for “good” exposures.

Supervisory categories and EL risk weights for HVCRE

379. The risk weights for HVCRE are as follows:

Strong	Good	Satisfactory	Weak	Default
5%	5%	35%	100%	625%

Even where, at national discretion, supervisors allow banks to assign preferential risk weights to HVCRE exposures falling into the “strong” and “good” supervisory categories as outlined in paragraph 282, the corresponding EL risk weight will remain at 5% for both “strong” and “good” exposures.

2. Calculation of provisions

(i) *Exposures subject to IRB approach*

380. Total eligible provisions are defined as the sum of all provisions (e.g. specific provisions, partial write-offs, portfolio-specific general provisions such as country risk provisions or general provisions) that are attributed to exposures treated under the IRB approach. In addition, total eligible provisions may include any discounts on defaulted assets. Specific provisions set aside against equity and securitisation exposures must not be included in total eligible provisions.

(ii) *Portion of exposures subject to the standardised approach to credit risk*

381. Banks using the standardised approach for a portion of their credit risk exposures, either on a transitional basis (as defined in paragraphs 257 and 258), or on a permanent

basis if the exposures subject to the standardised approach are immaterial (paragraph 259), must determine the portion of general provisions attributed to the standardised or IRB treatment of provisions (see paragraph 42) according to the methods outlined in paragraphs 382 and 383.

382. Banks should generally attribute total general provisions on a pro rata basis according to the proportion of credit risk-weighted assets subject to the standardised and IRB approaches. However, when one approach to determining credit risk-weighted assets (i.e. standardised or IRB approach) is used exclusively within an entity, general provisions booked within the entity using the standardised approach may be attributed to the standardised treatment. Similarly, general provisions booked within entities using the IRB approach may be attributed to the total eligible provisions as defined in paragraph 380.

383. At national supervisory discretion, banks using both the standardised and IRB approaches may rely on their internal methods for allocating general provisions for recognition in capital under either the standardised or IRB approach, subject to the following conditions. Where the internal allocation method is made available, the national supervisor will establish the standards surrounding their use. Banks will need to obtain prior approval from their supervisors to use an internal allocation method for this purpose.

3. Treatment of EL and provisions

384. As specified in paragraph 43, banks using the IRB approach must compare the total amount of total eligible provisions (as defined in paragraph 380) with the total EL amount as calculated within the IRB approach (as defined in paragraph 375). In addition, paragraph 42 outlines the treatment for that portion of a bank that is subject to the standardised approach to credit risk when the bank uses both the standardised and IRB approaches.

385. Where the calculated EL amount is lower than the provisions of the bank, its supervisors must consider whether the EL fully reflects the conditions in the market in which it operates before allowing the difference to be included in Tier 2 capital. If specific provisions exceed the EL amount on defaulted assets this assessment also needs to be made before using the difference to offset the EL amount on non-defaulted assets.

386. The EL amount for equity exposures under the PD/LGD approach is deducted 50% from Tier 1 and 50% from Tier 2. Provisions or write-offs for equity exposures under the PD/LGD approach will not be used in the EL-provision calculation. The treatment of EL and provisions related to securitisation exposures is outlined in paragraph 563.

H. Minimum Requirements for IRB Approach

387. Section III.H presents the minimum requirements for entry and on-going use of the IRB approach. The minimum requirements are set out in 12 separate sections concerning: (a) composition of minimum requirements, (b) compliance with minimum requirements, (c) rating system design, (d) risk rating system operations, (e) corporate governance and oversight, (f) use of internal ratings, (g) risk quantification, (h) validation of internal estimates, (i) supervisory LGD and EAD estimates, (j) requirements for recognition of leasing, (k) calculation of capital charges for equity exposures, and (l) disclosure requirements. It may be helpful to note that the minimum requirements cut across asset classes. Therefore, more than one asset class may be discussed within the context of a given minimum requirement.

1. Composition of minimum requirements

388. To be eligible for the IRB approach a bank must demonstrate to its supervisor that it meets certain minimum requirements at the outset and on an ongoing basis. Many of these requirements are in the form of objectives that a qualifying bank's risk rating systems must fulfil. The focus is on banks' abilities to rank order and quantify risk in a consistent, reliable and valid fashion.

389. The overarching principle behind these requirements is that rating and risk estimation systems and processes provide for a meaningful assessment of borrower and transaction characteristics; a meaningful differentiation of risk; and reasonably accurate and consistent quantitative estimates of risk. Furthermore, the systems and processes must be consistent with internal use of these estimates. The Committee recognises that differences in markets, rating methodologies, banking products, and practices require banks and supervisors to customise their operational procedures. It is not the Committee's intention to dictate the form or operational detail of banks' risk management policies and practices. Each supervisor will develop detailed review procedures to ensure that banks' systems and controls are adequate to serve as the basis for the IRB approach.

390. The minimum requirements set out in this document apply to all asset classes unless noted otherwise. The standards related to the process of assigning exposures to borrower or facility *grades* (and the related oversight, validation, etc.) apply equally to the process of assigning retail exposures to pools of homogenous exposures, unless noted otherwise.

391. The minimum requirements set out in this document apply to both foundation and advanced approaches unless noted otherwise. Generally, all IRB banks must produce their own estimates of PD⁸⁶ and must adhere to the overall requirements for rating system design, operations, controls, and corporate governance, as well as the requisite requirements for estimation and validation of PD measures. Banks wishing to use their own estimates of LGD and EAD must also meet the incremental minimum requirements for these risk factors included in paragraphs 468 to 489.

2. Compliance with minimum requirements

392. To be eligible for an IRB approach, a bank must demonstrate to its supervisor that it meets the IRB requirements in this document, at the outset and on an ongoing basis. Banks' overall credit risk management practices must also be consistent with the evolving sound practice guidelines issued by the Committee and national supervisors.

393. There may be circumstances when a bank is not in complete compliance with all the minimum requirements. Where this is the case, the bank must produce a plan for a timely return to compliance, and seek approval from its supervisor, or the bank must demonstrate that the effect of such non-compliance is immaterial in terms of the risk posed to the institution. Failure to produce an acceptable plan or satisfactorily implement the plan or to demonstrate immateriality will lead supervisors to reconsider the bank's eligibility for the IRB approach. Furthermore, for the duration of any non-compliance, supervisors will consider the need for the bank to hold additional capital under Pillar 2 or take other appropriate supervisory action.

⁸⁶ Banks are not required to produce their own estimates of PD for certain equity exposures and certain exposures that fall within the SL sub-class.

3. Rating system design

394. The term “rating system” comprises all of the methods, processes, controls, and data collection and IT systems that support the assessment of credit risk, the assignment of internal risk ratings, and the quantification of default and loss estimates.

395. Within each asset class, a bank may utilise multiple rating methodologies/systems. For example, a bank may have customised rating systems for specific industries or market segments (e.g. middle market, and large corporate). If a bank chooses to use multiple systems, the rationale for assigning a borrower to a rating system must be documented and applied in a manner that best reflects the level of risk of the borrower. Banks must not allocate borrowers across rating systems inappropriately to minimise regulatory capital requirements (i.e. cherry-picking by choice of rating system). Banks must demonstrate that each system used for IRB purposes is in compliance with the minimum requirements at the outset and on an ongoing basis.

(i) Rating dimensions

Standards for corporate, sovereign, and bank exposures

396. A qualifying IRB rating system must have two separate and distinct dimensions: (i) the risk of borrower default, and (ii) transaction-specific factors.

397. The first dimension must be oriented to the risk of borrower default. Separate exposures to the same borrower must be assigned to the same borrower grade, irrespective of any differences in the nature of each specific transaction. There are two exceptions to this. Firstly, in the case of country transfer risk, where a bank may assign different borrower grades depending on whether the facility is denominated in local or foreign currency. Secondly, when the treatment of associated guarantees to a facility may be reflected in an adjusted borrower grade. In either case, separate exposures may result in multiple grades for the same borrower. A bank must articulate in its credit policy the relationship between borrower grades in terms of the level of risk each grade implies. Perceived and measured risk must increase as credit quality declines from one grade to the next. The policy must articulate the risk of each grade in terms of both a description of the probability of default risk typical for borrowers assigned the grade and the criteria used to distinguish that level of credit risk.

398. The second dimension must reflect transaction-specific factors, such as collateral, seniority, product type, etc. For foundation IRB banks, this requirement can be fulfilled by the existence of a facility dimension, which reflects both borrower and transaction-specific factors. For example, a rating dimension that reflects EL by incorporating both borrower strength (PD) and loss severity (LGD) considerations would qualify. Likewise a rating system that exclusively reflects LGD would qualify. Where a rating dimension reflects EL and does not separately quantify LGD, the supervisory estimates of LGD must be used.

399. For banks using the advanced approach, facility ratings must reflect exclusively LGD. These ratings can reflect any and all factors that can influence LGD including, but not limited to, the type of collateral, product, industry, and purpose. Borrower characteristics may be included as LGD rating criteria only to the extent they are predictive of LGD. Banks may alter the factors that influence facility grades across segments of the portfolio as long as they can satisfy their supervisor that it improves the relevance and precision of their estimates.

400. Banks using the supervisory slotting criteria for the SL sub-class are exempt from this two-dimensional requirement for these exposures. Given the interdependence between borrower/transaction characteristics in SL, banks may satisfy the requirements under this heading through a single rating dimension that reflects EL by incorporating both borrower

strength (PD) and loss severity (LGD) considerations. This exemption does not apply to banks using either the general corporate foundation or advanced approach for the SL subclass.

Standards for retail exposures

401. Rating systems for retail exposures must be oriented to both borrower and transaction risk, and must capture all relevant borrower and transaction characteristics. Banks must assign each exposure that falls within the definition of retail for IRB purposes into a particular pool. Banks must demonstrate that this process provides for a meaningful differentiation of risk, provides for a grouping of sufficiently homogenous exposures, and allows for accurate and consistent estimation of loss characteristics at pool level.

402. For each pool, banks must estimate PD, LGD, and EAD. Multiple pools may share identical PD, LGD and EAD estimates. At a minimum, banks should consider the following risk drivers when assigning exposures to a pool:

- Borrower risk characteristics (e.g. borrower type, demographics such as age/occupation);
- Transaction risk characteristics, including product and/or collateral types (e.g. loan to value measures, seasoning, guarantees; and seniority (first vs. second lien)). Banks must explicitly address cross-collateral provisions where present.
- Delinquency of exposure: Banks are expected to separately identify exposures that are delinquent and those that are not.

(ii) Rating structure

Standards for corporate, sovereign, and bank exposures

403. A bank must have a meaningful distribution of exposures across grades with no excessive concentrations, on both its borrower-rating and its facility-rating scales.

404. To meet this objective, a bank must have a minimum of seven borrower grades for non-defaulted borrowers and one for those that have defaulted. Banks with lending activities focused on a particular market segment may satisfy this requirement with the minimum number of grades; supervisors may require banks, which lend to borrowers of diverse credit quality, to have a greater number of borrower grades.

405. A borrower grade is defined as an assessment of borrower risk on the basis of a specified and distinct set of rating criteria, from which estimates of PD are derived. The grade definition must include both a description of the degree of default risk typical for borrowers assigned the grade and the criteria used to distinguish that level of credit risk. Furthermore, "+" or "-" modifiers to alpha or numeric grades will only qualify as distinct grades if the bank has developed complete rating descriptions and criteria for their assignment, and separately quantifies PDs for these modified grades.

406. Banks with loan portfolios concentrated in a particular market segment and range of default risk must have enough grades within that range to avoid undue concentrations of borrowers in particular grades. Significant concentrations within a single grade or grades must be supported by convincing empirical evidence that the grade or grades cover reasonably narrow PD bands and that the default risk posed by all borrowers in a grade fall within that band.

407. There is no specific minimum number of facility grades for banks using the advanced approach for estimating LGD. A bank must have a sufficient number of facility

grades to avoid grouping facilities with widely varying LGDs into a single grade. The criteria used to define facility grades must be grounded in empirical evidence.

408. Banks using the supervisory slotting criteria for the SL asset classes must have at least four grades for non-defaulted borrowers, and one for defaulted borrowers. The requirements for SL exposures that qualify for the corporate foundation and advanced approaches are the same as those for general corporate exposures.

Standards for retail exposures

409. For each pool identified, the bank must be able to provide quantitative measures of loss characteristics (PD, LGD, and EAD) for that pool. The level of differentiation for IRB purposes must ensure that the number of exposures in a given pool is sufficient so as to allow for meaningful quantification and validation of the loss characteristics at the pool level. There must be a meaningful distribution of borrowers and exposures across pools. A single pool must not include an undue concentration of the bank's total retail exposure.

(iii) Rating criteria

410. A bank must have specific rating definitions, processes and criteria for assigning exposures to grades within a rating system. The rating definitions and criteria must be both plausible and intuitive and must result in a meaningful differentiation of risk.

- The grade descriptions and criteria must be sufficiently detailed to allow those charged with assigning ratings to consistently assign the same grade to borrowers or facilities posing similar risk. This consistency should exist across lines of business, departments and geographic locations. If rating criteria and procedures differ for different types of borrowers or facilities, the bank must monitor for possible inconsistency, and must alter rating criteria to improve consistency when appropriate.
- Written rating definitions must be clear and detailed enough to allow third parties to understand the assignment of ratings, such as internal audit or an equally independent function and supervisors, to replicate rating assignments and evaluate the appropriateness of the grade/pool assignments.
- The criteria must also be consistent with the bank's internal lending standards and its policies for handling troubled borrowers and facilities.

411. To ensure that banks are consistently taking into account available information, they must use all relevant and material information in assigning ratings to borrowers and facilities. Information must be current. The less information a bank has, the more conservative must be its assignments of exposures to borrower and facility grades or pools. An external rating can be the primary factor determining an internal rating assignment; however, the bank must ensure that it considers other relevant information.

SL product lines within the corporate asset class

412. Banks using the supervisory slotting criteria for SL exposures must assign exposures to their internal rating grades based on their own criteria, systems and processes, subject to compliance with the requisite minimum requirements. Banks must then map these internal rating grades into the five supervisory rating categories. Tables 1 to 4 in Annex 6 provide, for each sub-class of SL exposures, the general assessment factors and characteristics exhibited by the exposures that fall under each of the supervisory categories. Each lending activity has a unique table describing the assessment factors and characteristics.

413. The Committee recognises that the criteria that banks use to assign exposures to internal grades will not perfectly align with criteria that define the supervisory categories; however, banks must demonstrate that their mapping process has resulted in an alignment of grades which is consistent with the preponderance of the characteristics in the respective supervisory category. Banks should take special care to ensure that any overrides of their internal criteria do not render the mapping process ineffective.

(iv) *Rating assignment horizon*

414. Although the time horizon used in PD estimation is one year (as described in paragraph 447), banks are expected to use a longer time horizon in assigning ratings.

415. A borrower rating must represent the bank's assessment of the borrower's ability and willingness to contractually perform despite adverse economic conditions or the occurrence of unexpected events. For example, a bank may base rating assignments on specific, appropriate stress scenarios. Alternatively, a bank may take into account borrower characteristics that are reflective of the borrower's vulnerability to adverse economic conditions or unexpected events, without explicitly specifying a stress scenario. The range of economic conditions that are considered when making assessments must be consistent with current conditions and those that are likely to occur over a business cycle within the respective industry/geographic region.

416. Given the difficulties in forecasting future events and the influence they will have on a particular borrower's financial condition, a bank must take a conservative view of projected information. Furthermore, where limited data are available, a bank must adopt a conservative bias to its analysis.

(v) *Use of models*

417. The requirements in this section apply to statistical models and other mechanical methods used to assign borrower or facility ratings or in estimation of PDs, LGDs, or EADs. Credit scoring models and other mechanical rating procedures generally use only a subset of available information. Although mechanical rating procedures may sometimes avoid some of the idiosyncratic errors made by rating systems in which human judgement plays a large role, mechanical use of limited information also is a source of rating errors. Credit scoring models and other mechanical procedures are permissible as the primary or partial basis of rating assignments, and may play a role in the estimation of loss characteristics. Sufficient human judgement and human oversight is necessary to ensure that all relevant and material information, including that which is outside the scope of the model, is also taken into consideration, and that the model is used appropriately.

- The burden is on the bank to satisfy its supervisor that a model or procedure has good predictive power and that regulatory capital requirements will not be distorted as a result of its use. The variables that are input to the model must form a reasonable set of predictors. The model must be accurate on average across the range of borrowers or facilities to which the bank is exposed and there must be no known material biases.
- The bank must have in place a process for vetting data inputs into a statistical default or loss prediction model which includes an assessment of the accuracy, completeness and appropriateness of the data specific to the assignment of an approved rating.
- The bank must demonstrate that the data used to build the model are representative of the population of the bank's actual borrowers or facilities.

- When combining model results with human judgement, the judgement must take into account all relevant and material information not considered by the model. The bank must have written guidance describing how human judgement and model results are to be combined.
- The bank must have procedures for human review of model-based rating assignments. Such procedures should focus on finding and limiting errors associated with known model weaknesses and must also include credible ongoing efforts to improve the model's performance.
- The bank must have a regular cycle of model validation that includes monitoring of model performance and stability; review of model relationships; and testing of model outputs against outcomes.

(vi) *Documentation of rating system design*

418. Banks must document in writing their rating systems' design and operational details. The documentation must evidence banks' compliance with the minimum standards, and must address topics such as portfolio differentiation, rating criteria, responsibilities of parties that rate borrowers and facilities, definition of what constitutes a rating exception, parties that have authority to approve exceptions, frequency of rating reviews, and management oversight of the rating process. A bank must document the rationale for its choice of internal rating criteria and must be able to provide analyses demonstrating that rating criteria and procedures are likely to result in ratings that meaningfully differentiate risk. Rating criteria and procedures must be periodically reviewed to determine whether they remain fully applicable to the current portfolio and to external conditions. In addition, a bank must document a history of major changes in the risk rating process, and such documentation must support identification of changes made to the risk rating process subsequent to the last supervisory review. The organisation of rating assignment, including the internal control structure, must also be documented.

419. Banks must document the specific definitions of default and loss used internally and demonstrate consistency with the reference definitions set out in paragraphs 452 to 460.

420. If the bank employs statistical models in the rating process, the bank must document their methodologies. This material must:

- Provide a detailed outline of the theory, assumptions and/or mathematical and empirical basis of the assignment of estimates to grades, individual obligors, exposures, or pools, and the data source(s) used to estimate the model;
- Establish a rigorous statistical process (including out-of-time and out-of-sample performance tests) for validating the model; and
- Indicate any circumstances under which the model does not work effectively.

421. Use of a model obtained from a third-party vendor that claims proprietary technology is not a justification for exemption from documentation or any other of the requirements for internal rating systems. The burden is on the model's vendor and the bank to satisfy supervisors.

4. Risk rating system operations

(i) *Coverage of ratings*

422. For corporate, sovereign, and bank exposures, each borrower and all recognised guarantors must be assigned a rating and each exposure must be associated with a facility

rating as part of the loan approval process. Similarly, for retail, each exposure must be assigned to a pool as part of the loan approval process.

423. Each separate legal entity to which the bank is exposed must be separately rated. A bank must have policies acceptable to its supervisor regarding the treatment of individual entities in a connected group including circumstances under which the same rating may or may not be assigned to some or all related entities.

(ii) Integrity of rating process

Standards for corporate, sovereign, and bank exposures

424. Rating assignments and periodic rating reviews must be completed or approved by a party that does not directly stand to benefit from the extension of credit. Independence of the rating assignment process can be achieved through a range of practices that will be carefully reviewed by supervisors. These operational processes must be documented in the bank's procedures and incorporated into bank policies. Credit policies and underwriting procedures must reinforce and foster the independence of the rating process.

425. Borrowers and facilities must have their ratings refreshed at least on an annual basis. Certain credits, especially higher risk borrowers or problem exposures, must be subject to more frequent review. In addition, banks must initiate a new rating if material information on the borrower or facility comes to light.

426. The bank must have an effective process to obtain and update relevant and material information on the borrower's financial condition, and on facility characteristics that affect LGDs and EADs (such as the condition of collateral). Upon receipt, the bank needs to have a procedure to update the borrower's rating in a timely fashion.

Standards for retail exposures

427. A bank must review the loss characteristics and delinquency status of each identified risk pool on at least an annual basis. It must also review the status of individual borrowers within each pool as a means of ensuring that exposures continue to be assigned to the correct pool. This requirement may be satisfied by review of a representative sample of exposures in the pool.

(iii) Overrides

428. For rating assignments based on expert judgement, banks must clearly articulate the situations in which bank officers may override the outputs of the rating process, including how and to what extent such overrides can be used and by whom. For model-based ratings, the bank must have guidelines and processes for monitoring cases where human judgement has overridden the model's rating, variables were excluded or inputs were altered. These guidelines must include identifying personnel that are responsible for approving these overrides. Banks must identify overrides and separately track their performance.

(iv) Data maintenance

429. A bank must collect and store data on key borrower and facility characteristics to provide effective support to its internal credit risk measurement and management process, to enable the bank to meet the other requirements in this document, and to serve as a basis for supervisory reporting. These data should be sufficiently detailed to allow retrospective re-allocation of obligors and facilities to grades, for example if increasing sophistication of the internal rating system suggests that finer segregation of portfolios can be achieved.

Furthermore, banks must collect and retain data on aspects of their internal ratings as required under Pillar 3 of this Framework.

For corporate, sovereign, and bank exposures

430. Banks must maintain rating histories on borrowers and recognised guarantors, including the rating since the borrower/guarantor was assigned an internal grade, the dates the ratings were assigned, the methodology and key data used to derive the rating and the person/model responsible. The identity of borrowers and facilities that default, and the timing and circumstances of such defaults, must be retained. Banks must also retain data on the PDs and realised default rates associated with rating grades and ratings migration in order to track the predictive power of the borrower rating system.

431. Banks using the advanced IRB approach must also collect and store a complete history of data on the LGD and EAD estimates associated with each facility and the key data used to derive the estimate and the person/model responsible. Banks must also collect data on the estimated and realised LGDs and EADs associated with each defaulted facility. Banks that reflect the credit risk mitigating effects of guarantees/credit derivatives through LGD must retain data on the LGD of the facility before and after evaluation of the effects of the guarantee/credit derivative. Information about the components of loss or recovery for each defaulted exposure must be retained, such as amounts recovered, source of recovery (e.g. collateral, liquidation proceeds and guarantees), time period required for recovery, and administrative costs.

432. Banks under the foundation approach which utilise supervisory estimates are encouraged to retain the relevant data (i.e. data on loss and recovery experience for corporate exposures under the foundation approach, data on realised losses for banks using the supervisory slotting criteria for SL).

For retail exposures

433. Banks must retain data used in the process of allocating exposures to pools, including data on borrower and transaction risk characteristics used either directly or through use of a model, as well as data on delinquency. Banks must also retain data on the estimated PDs, LGDs and EADs, associated with pools of exposures. For defaulted exposures, banks must retain the data on the pools to which the exposure was assigned over the year prior to default and the realised outcomes on LGD and EAD.

(v) *Stress tests used in assessment of capital adequacy*

434. An IRB bank must have in place sound stress testing processes for use in the assessment of capital adequacy. Stress testing must involve identifying possible events or future changes in economic conditions that could have unfavourable effects on a bank's credit exposures and assessment of the bank's ability to withstand such changes. Examples of scenarios that could be used are (i) economic or industry downturns; (ii) market-risk events; and (iii) liquidity conditions.

435. In addition to the more general tests described above, the bank must perform a credit risk stress test to assess the effect of certain specific conditions on its IRB regulatory capital requirements. The test to be employed would be one chosen by the bank, subject to supervisory review. The test to be employed must be meaningful and reasonably conservative. Individual banks may develop different approaches to undertaking this stress test requirement, depending on their circumstances. For this purpose, the objective is not to require banks to consider worst-case scenarios. The bank's stress test in this context should, however, consider at least the effect of mild recession scenarios. In this case, one example

might be to use two consecutive quarters of zero growth to assess the effect on the bank's PDs, LGDs and EADs, taking account — on a conservative basis — of the bank's international diversification.

435(i) Banks using the double default framework must consider as part of their stress testing framework the impact of a deterioration in the credit quality of protection providers, in particular the impact of protection providers falling outside the eligibility criteria due to rating changes. Banks should also consider the impact of the default of one but not both of the obligor and protection provider, and the consequent increase in risk and capital requirements at the time of that default.

436. Whatever method is used, the bank must include a consideration of the following sources of information. First, a bank's own data should allow estimation of the ratings migration of at least some of its exposures. Second, banks should consider information about the impact of smaller deterioration in the credit environment on a bank's ratings, giving some information on the likely effect of bigger, stress circumstances. Third, banks should evaluate evidence of ratings migration in external ratings. This would include the bank broadly matching its buckets to rating categories.

437. National supervisors may wish to issue guidance to their banks on how the tests to be used for this purpose should be designed, bearing in mind conditions in their jurisdiction. The results of the stress test may indicate no difference in the capital calculated under the IRB rules described in this section of this Framework if the bank already uses such an approach for its internal rating purposes. Where a bank operates in several markets, it does not need to test for such conditions in all of those markets, but a bank should stress portfolios containing the vast majority of its total exposures.

5. Corporate governance and oversight

(i) Corporate governance

438. All material aspects of the rating and estimation processes must be approved by the bank's board of directors or a designated committee thereof and senior management.⁸⁷ These parties must possess a general understanding of the bank's risk rating system and detailed comprehension of its associated management reports. Senior management must provide notice to the board of directors or a designated committee thereof of material changes or exceptions from established policies that will materially impact the operations of the bank's rating system.

439. Senior management also must have a good understanding of the rating system's design and operation, and must approve material differences between established procedure and actual practice. Management must also ensure, on an ongoing basis, that the rating system is operating properly. Management and staff in the credit control function must meet

⁸⁷ This standard refers to a management structure composed of a board of directors and senior management. The Committee is aware that there are significant differences in legislative and regulatory frameworks across countries as regards the functions of the board of directors and senior management. In some countries, the board has the main, if not exclusive, function of supervising the executive body (senior management, general management) so as to ensure that the latter fulfils its tasks. For this reason, in some cases, it is known as a supervisory board. This means that the board has no executive functions. In other countries, by contrast, the board has a broader competence in that it lays down the general framework for the management of the bank. Owing to these differences, the notions of the board of directors and senior management are used in this paper not to identify legal constructs but rather to label two decision-making functions within a bank.

regularly to discuss the performance of the rating process, areas needing improvement, and the status of efforts to improve previously identified deficiencies.

440. Internal ratings must be an essential part of the reporting to these parties. Reporting must include risk profile by grade, migration across grades, estimation of the relevant parameters per grade, and comparison of realised default rates (and LGDs and EADs for banks on advanced approaches) against expectations. Reporting frequencies may vary with the significance and type of information and the level of the recipient.

(ii) Credit risk control

441. Banks must have independent credit risk control units that are responsible for the design or selection, implementation and performance of their internal rating systems. The unit(s) must be functionally independent from the personnel and management functions responsible for originating exposures. Areas of responsibility must include:

- Testing and monitoring internal grades;
- Production and analysis of summary reports from the bank's rating system, to include historical default data sorted by rating at the time of default and one year prior to default, grade migration analyses, and monitoring of trends in key rating criteria;
- Implementing procedures to verify that rating definitions are consistently applied across departments and geographic areas;
- Reviewing and documenting any changes to the rating process, including the reasons for the changes; and
- Reviewing the rating criteria to evaluate if they remain predictive of risk. Changes to the rating process, criteria or individual rating parameters must be documented and retained for supervisors to review.

442. A credit risk control unit must actively participate in the development, selection, implementation and validation of rating models. It must assume oversight and supervision responsibilities for any models used in the rating process, and ultimate responsibility for the ongoing review and alterations to rating models.

(iii) Internal and external audit

443. Internal audit or an equally independent function must review at least annually the bank's rating system and its operations, including the operations of the credit function and the estimation of PDs, LGDs and EADs. Areas of review include adherence to all applicable minimum requirements. Internal audit must document its findings. Some national supervisors may also require an external audit of the bank's rating assignment process and estimation of loss characteristics.

6. Use of internal ratings

444. Internal ratings and default and loss estimates must play an essential role in the credit approval, risk management, internal capital allocations, and corporate governance functions of banks using the IRB approach. Ratings systems and estimates designed and implemented exclusively for the purpose of qualifying for the IRB approach and used only to provide IRB inputs are not acceptable. It is recognised that banks will not necessarily be using exactly the same estimates for both IRB and all internal purposes. For example, pricing models are likely to use PDs and LGDs relevant to the life of the asset. Where there are such

differences, a bank must document them and demonstrate their reasonableness to the supervisor.

445. A bank must have a credible track record in the use of internal ratings information. Thus, the bank must demonstrate that it has been using a rating system that was broadly in line with the minimum requirements articulated in this document for at least the three years prior to qualification. A bank using the advanced IRB approach must demonstrate that it has been estimating and employing LGDs and EADs in a manner that is broadly consistent with the minimum requirements for use of own estimates of LGDs and EADs for at least the three years prior to qualification. Improvements to a bank's rating system will not render a bank non-compliant with the three-year requirement.

7. Risk quantification

(i) Overall requirements for estimation

Structure and intent

446. This section addresses the broad standards for own-estimates of PD, LGD, and EAD. Generally, all banks using the IRB approaches must estimate a PD⁸⁸ for each internal borrower grade for corporate, sovereign and bank exposures or for each pool in the case of retail exposures.

447. PD estimates must be a long-run average of one-year default rates for borrowers in the grade, with the exception of retail exposures (see below). Requirements specific to PD estimation are provided in paragraphs 461 to 467. Banks on the advanced approach must estimate an appropriate LGD (as defined in paragraphs 468 to 473) for each of its facilities (or retail pools). Banks on the advanced approach must also estimate an appropriate long-run default-weighted average EAD for each of its facilities as defined in paragraphs 474 and 475. Requirements specific to EAD estimation appear in paragraphs 474 to 479. For corporate, sovereign and bank exposures, banks that do not meet the requirements for own-estimates of EAD or LGD, above, must use the supervisory estimates of these parameters. Standards for use of such estimates are set out in paragraphs 506 to 524.

448. Internal estimates of PD, LGD, and EAD must incorporate all relevant, material and available data, information and methods. A bank may utilise internal data and data from external sources (including pooled data). Where internal or external data is used, the bank must demonstrate that its estimates are representative of long run experience.

449. Estimates must be grounded in historical experience and empirical evidence, and not based purely on subjective or judgmental considerations. Any changes in lending practice or the process for pursuing recoveries over the observation period must be taken into account. A bank's estimates must promptly reflect the implications of technical advances and new data and other information, as it becomes available. Banks must review their estimates on a yearly basis or more frequently.

450. The population of exposures represented in the data used for estimation, and lending standards in use when the data were generated, and other relevant characteristics should be closely matched to or at least comparable with those of the bank's exposures and standards. The bank must also demonstrate that economic or market conditions that underlie

⁸⁸ Banks are not required to produce their own estimates of PD for certain equity exposures and certain exposures that fall within the SL sub-classes.

the data are relevant to current and foreseeable conditions. For estimates of LGD and EAD, banks must take into account paragraphs 468 to 479. The number of exposures in the sample and the data period used for quantification must be sufficient to provide the bank with confidence in the accuracy and robustness of its estimates. The estimation technique must perform well in out-of-sample tests.

451. In general, estimates of PDs, LGDs, and EADs are likely to involve unpredictable errors. In order to avoid over-optimism, a bank must add to its estimates a margin of conservatism that is related to the likely range of errors. Where methods and data are less satisfactory and the likely range of errors is larger, the margin of conservatism must be larger. Supervisors may allow some flexibility in application of the required standards for data that are collected prior to the date of implementation of this Framework. However, in such cases banks must demonstrate to their supervisors that appropriate adjustments have been made to achieve broad equivalence to the data without such flexibility. Data collected beyond the date of implementation must conform to the minimum standards unless otherwise stated.

(ii) *Definition of default*

452. A default is considered to have occurred with regard to a particular obligor when either or both of the two following events have taken place.

- The bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as realising security (if held).
- The obligor is past due more than 90 days on any material credit obligation to the banking group.⁸⁹ Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstandings.

453. The elements to be taken as indications of unlikelihood to pay include:

- The bank puts the credit obligation on non-accrued status.
- The bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.⁹⁰
- The bank sells the credit obligation at a material credit-related economic loss.
- The bank consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.⁹¹
- The bank has filed for the obligor's bankruptcy or a similar order in respect of the obligor's credit obligation to the banking group.

⁸⁹ In the case of retail and PSE obligations, for the 90 days figure, a supervisor may substitute a figure up to 180 days for different products, as it considers appropriate to local conditions. In one member country, local conditions make it appropriate to use a figure of up to 180 days also for lending by its banks to corporates; this applies for a transitional period of 5 years.

⁹⁰ In some jurisdictions, specific provisions on equity exposures are set aside for price risk and do not signal default.

⁹¹ Including, in the case of equity holdings assessed under a PD/LGD approach, such distressed restructuring of the equity itself.

- The obligor has sought or has been placed in bankruptcy or similar protection where this would avoid or delay repayment of the credit obligation to the banking group.

454. National supervisors will provide appropriate guidance as to how these elements must be implemented and monitored.

455. For retail exposures, the definition of default can be applied at the level of a particular facility, rather than at the level of the obligor. As such, default by a borrower on one obligation does not require a bank to treat all other obligations to the banking group as defaulted.

456. A bank must record actual defaults on IRB exposure classes using this reference definition. A bank must also use the reference definition for its estimation of PDs, and (where relevant) LGDs and EADs. In arriving at these estimations, a bank may use external data available to it that is not itself consistent with that definition, subject to the requirements set out in paragraph 462. However, in such cases, banks must demonstrate to their supervisors that appropriate adjustments to the data have been made to achieve broad equivalence with the reference definition. This same condition would apply to any internal data used up to implementation of this Framework. Internal data (including that pooled by banks) used in such estimates beyond the date of implementation of this Framework must be consistent with the reference definition.

457. If the bank considers that a previously defaulted exposure's status is such that no trigger of the reference definition any longer applies, the bank must rate the borrower and estimate LGD as they would for a non-defaulted facility. Should the reference definition subsequently be triggered, a second default would be deemed to have occurred.

(iii) Re-ageing

458. The bank must have clearly articulated and documented policies in respect of the counting of days past due, in particular in respect of the re-ageing of the facilities and the granting of extensions, deferrals, renewals and rewrites to existing accounts. At a minimum, the re-ageing policy must include: (a) approval authorities and reporting requirements; (b) minimum age of a facility before it is eligible for re-ageing; (c) delinquency levels of facilities that are eligible for re-ageing; (d) maximum number of re-ageings per facility; and (e) a reassessment of the borrower's capacity to repay. These policies must be applied consistently over time, and must support the 'use test' (i.e. if a bank treats a re-aged exposure in a similar fashion to other delinquent exposures more than the past-due cut off point, this exposure must be recorded as in default for IRB purposes). Some supervisors may choose to establish more specific requirements on re-ageing for banks in their jurisdiction.

(iv) Treatment of overdrafts

459. Authorised overdrafts must be subject to a credit limit set by the bank and brought to the knowledge of the client. Any break of this limit must be monitored; if the account were not brought under the limit after 90 to 180 days (subject to the applicable past-due trigger), it would be considered as defaulted. Non-authorised overdrafts will be associated with a zero limit for IRB purposes. Thus, days past due commence once any credit is granted to an unauthorised customer; if such credit were not repaid within 90 to 180 days, the exposure would be considered in default. Banks must have in place rigorous internal policies for assessing the creditworthiness of customers who are offered overdraft accounts.

(v) *Definition of loss for all asset classes*

460. The definition of loss used in estimating LGD is economic loss. When measuring economic loss, all relevant factors should be taken into account. This must include material discount effects and material direct and indirect costs associated with collecting on the exposure. Banks must not simply measure the loss recorded in accounting records, although they must be able to compare accounting and economic losses. The bank's own workout and collection expertise significantly influences their recovery rates and must be reflected in their LGD estimates, but adjustments to estimates for such expertise must be conservative until the bank has sufficient internal empirical evidence of the impact of its expertise.

(vi) *Requirements specific to PD estimation*

Corporate, sovereign, and bank exposures

461. Banks must use information and techniques that take appropriate account of the long-run experience when estimating the average PD for each rating grade. For example, banks may use one or more of the three specific techniques set out below: internal default experience, mapping to external data, and statistical default models.

462. Banks may have a primary technique and use others as a point of comparison and potential adjustment. Supervisors will not be satisfied by mechanical application of a technique without supporting analysis. Banks must recognise the importance of judgmental considerations in combining results of techniques and in making adjustments for limitations of techniques and information.

- A bank may use data on internal default experience for the estimation of PD. A bank must demonstrate in its analysis that the estimates are reflective of underwriting standards and of any differences in the rating system that generated the data and the current rating system. Where only limited data are available, or where underwriting standards or rating systems have changed, the bank must add a greater margin of conservatism in its estimate of PD. The use of pooled data across institutions may also be recognised. A bank must demonstrate that the internal rating systems and criteria of other banks in the pool are comparable with its own.
- Banks may associate or map their internal grades to the scale used by an external credit assessment institution or similar institution and then attribute the default rate observed for the external institution's grades to the bank's grades. Mappings must be based on a comparison of internal rating criteria to the criteria used by the external institution and on a comparison of the internal and external ratings of any common borrowers. Biases or inconsistencies in the mapping approach or underlying data must be avoided. The external institution's criteria underlying the data used for quantification must be oriented to the risk of the borrower and not reflect transaction characteristics. The bank's analysis must include a comparison of the default definitions used, subject to the requirements in paragraph 452 to 457. The bank must document the basis for the mapping.
- A bank is allowed to use a simple average of default-probability estimates for individual borrowers in a given grade, where such estimates are drawn from statistical default prediction models. The bank's use of default probability models for this purpose must meet the standards specified in paragraph 417.

463. Irrespective of whether a bank is using external, internal, or pooled data sources, or a combination of the three, for its PD estimation, the length of the underlying historical observation period used must be at least five years for at least one source. If the available observation period spans a longer period for any source, and this data are relevant and material, this longer period must be used.

Retail exposures

464. Given the bank-specific basis of assigning exposures to pools, banks must regard internal data as the primary source of information for estimating loss characteristics. Banks are permitted to use external data or statistical models for quantification provided a strong link can be demonstrated between (a) the bank's process of assigning exposures to a pool and the process used by the external data source, and (b) between the bank's internal risk profile and the composition of the external data. In all cases banks must use all relevant and material data sources as points of comparison.

465. One method for deriving long-run average estimates of PD and default-weighted average loss rates given default (as defined in paragraph 468) for retail would be based on an estimate of the expected long-run loss rate. A bank may (i) use an appropriate PD estimate to infer the long-run default-weighted average loss rate given default, or (ii) use a long-run default-weighted average loss rate given default to infer the appropriate PD. In either case, it is important to recognise that the LGD used for the IRB capital calculation cannot be less than the long-run default-weighted average loss rate given default and must be consistent with the concepts defined in paragraph 468.

466. Irrespective of whether banks are using external, internal, pooled data sources, or a combination of the three, for their estimation of loss characteristics, the length of the underlying historical observation period used must be at least five years. If the available observation spans a longer period for any source, and these data are relevant, this longer period must be used. A bank need not give equal importance to historic data if it can convince its supervisor that more recent data are a better predictor of loss rates.

467. The Committee recognises that seasoning can be quite material for some long-term retail exposures characterised by seasoning effects that peak several years after origination. Banks should anticipate the implications of rapid exposure growth and take steps to ensure that their estimation techniques are accurate, and that their current capital level and earnings and funding prospects are adequate to cover their future capital needs. In order to avoid gyrations in their required capital positions arising from short-term PD horizons, banks are also encouraged to adjust PD estimates upward for anticipated seasoning effects, provided such adjustments are applied in a consistent fashion over time. Within some jurisdictions, such adjustments might be made mandatory, subject to supervisory discretion.

(vii) Requirements specific to own-LGD estimates

Standards for all asset classes

468. A bank must estimate an LGD for each facility that aims to reflect economic downturn conditions where necessary to capture the relevant risks. This LGD cannot be less than the long-run default-weighted average loss rate given default calculated based on the average economic loss of all observed defaults within the data source for that type of facility. In addition, a bank must take into account the potential for the LGD of the facility to be higher than the default-weighted average during a period when credit losses are substantially higher than average. For certain types of exposures, loss severities may not exhibit such cyclical variability and LGD estimates may not differ materially (or possibly at all) from the long-run default-weighted average. However, for other exposures, this cyclical variability in loss severities may be important and banks will need to incorporate it into their LGD estimates. For this purpose, banks may use averages of loss severities observed during periods of high credit losses, forecasts based on appropriately conservative assumptions, or other similar methods. Appropriate estimates of LGD during periods of high credit losses might be formed using either internal and/or external data. Supervisors will continue to monitor and encourage the development of appropriate approaches to this issue.

469. In its analysis, the bank must consider the extent of any dependence between the risk of the borrower and that of the collateral or collateral provider. Cases where there is a significant degree of dependence must be addressed in a conservative manner. Any currency mismatch between the underlying obligation and the collateral must also be considered and treated conservatively in the bank's assessment of LGD.

470. LGD estimates must be grounded in historical recovery rates and, when applicable, must not solely be based on the collateral's estimated market value. This requirement recognises the potential inability of banks to gain both control of their collateral and liquidate it expeditiously. To the extent, that LGD estimates take into account the existence of collateral, banks must establish internal requirements for collateral management, operational procedures, legal certainty and risk management process that are generally consistent with those required for the standardised approach.

471. Recognising the principle that realised losses can at times systematically exceed expected levels, the LGD assigned to a defaulted asset should reflect the possibility that the bank would have to recognise additional, unexpected losses during the recovery period. For each defaulted asset, the bank must also construct its best estimate of the expected loss on that asset based on current economic circumstances and facility status. The amount, if any, by which the LGD on a defaulted asset exceeds the bank's best estimate of expected loss on the asset represents the capital requirement for that asset, and should be set by the bank on a risk-sensitive basis in accordance with paragraphs 272 and 328 to 330. Instances where the best estimate of expected loss on a defaulted asset is less than the sum of specific provisions and partial charge-offs on that asset will attract supervisory scrutiny and must be justified by the bank.

Additional standards for corporate, sovereign, and bank exposures

472. Estimates of LGD must be based on a minimum data observation period that should ideally cover at least one complete economic cycle but must in any case be no shorter than a period of seven years for at least one source. If the available observation period spans a longer period for any source, and the data are relevant, this longer period must be used.

Additional standards for retail exposures

473. The minimum data observation period for LGD estimates for retail exposures is five years. The less data a bank has, the more conservative it must be in its estimation. A bank need not give equal importance to historic data if it can demonstrate to its supervisor that more recent data are a better predictor of loss rates.

(viii) Requirements specific to own-EAD estimates

Standards for all asset classes

474. EAD for an on-balance sheet or off-balance sheet item is defined as the expected gross exposure of the facility upon default of the obligor. For on-balance sheet items, banks must estimate EAD at no less than the current drawn amount, subject to recognising the effects of on-balance sheet netting as specified in the foundation approach. The minimum requirements for the recognition of netting are the same as those under the foundation approach. The additional minimum requirements for internal estimation of EAD under the advanced approach, therefore, focus on the estimation of EAD for off-balance sheet items (excluding transactions that expose banks to counterparty credit risk as set out in Annex 4). Advanced approach banks must have established procedures in place for the estimation of EAD for off-balance sheet items. These must specify the estimates of EAD to be used for each facility type. Banks estimates of EAD should reflect the possibility of additional drawings

by the borrower up to and after the time a default event is triggered. Where estimates of EAD differ by facility type, the delineation of these facilities must be clear and unambiguous.

475. Advanced approach banks must assign an estimate of EAD for each facility. It must be an estimate of the long-run default-weighted average EAD for similar facilities and borrowers over a sufficiently long period of time, but with a margin of conservatism appropriate to the likely range of errors in the estimate. If a positive correlation can reasonably be expected between the default frequency and the magnitude of EAD, the EAD estimate must incorporate a larger margin of conservatism. Moreover, for exposures for which EAD estimates are volatile over the economic cycle, the bank must use EAD estimates that are appropriate for an economic downturn, if these are more conservative than the long-run average. For banks that have been able to develop their own EAD models, this could be achieved by considering the cyclical nature, if any, of the drivers of such models. Other banks may have sufficient internal data to examine the impact of previous recession(s). However, some banks may only have the option of making conservative use of external data.

476. The criteria by which estimates of EAD are derived must be plausible and intuitive, and represent what the bank believes to be the material drivers of EAD. The choices must be supported by credible internal analysis by the bank. The bank must be able to provide a breakdown of its EAD experience by the factors it sees as the drivers of EAD. A bank must use all relevant and material information in its derivation of EAD estimates. Across facility types, a bank must review its estimates of EAD when material new information comes to light and at least on an annual basis.

477. Due consideration must be paid by the bank to its specific policies and strategies adopted in respect of account monitoring and payment processing. The bank must also consider its ability and willingness to prevent further drawings in circumstances short of payment default, such as covenant violations or other technical default events. Banks must also have adequate systems and procedures in place to monitor facility amounts, current outstandings against committed lines and changes in outstandings per borrower and per grade. The bank must be able to monitor outstanding balances on a daily basis.

477(i). For transactions that expose banks to counterparty credit risk, estimates of EAD must fulfil the requirements set forth in Annex 4 of this Framework.

Additional standards for corporate, sovereign, and bank exposures

478. Estimates of EAD must be based on a time period that must ideally cover a complete economic cycle but must in any case be no shorter than a period of seven years. If the available observation period spans a longer period for any source, and the data are relevant, this longer period must be used. EAD estimates must be calculated using a default-weighted average and not a time-weighted average.

Additional standards for retail exposures

479. The minimum data observation period for EAD estimates for retail exposures is five years. The less data a bank has, the more conservative it must be in its estimation. A bank need not give equal importance to historic data if it can demonstrate to its supervisor that more recent data are a better predictor of drawdowns.

(ix) *Minimum requirements for assessing effect of guarantees and credit derivatives*

Standards for corporate, sovereign, and bank exposures where own estimates of LGD are used and standards for retail exposures

Guarantees

480. When a bank uses its own estimates of LGD, it may reflect the risk-mitigating effect of guarantees through an adjustment to PD or LGD estimates. The option to adjust LGDs is available only to those banks that have been approved to use their own internal estimates of LGD. For retail exposures, where guarantees exist, either in support of an individual obligation or a pool of exposures, a bank may reflect the risk-reducing effect either through its estimates of PD or LGD, provided this is done consistently. In adopting one or the other technique, a bank must adopt a consistent approach, both across types of guarantees and over time.

481. In all cases, both the borrower and all recognised guarantors must be assigned a borrower rating at the outset and on an ongoing basis. A bank must follow all minimum requirements for assigning borrower ratings set out in this document, including the regular monitoring of the guarantor's condition and ability and willingness to honour its obligations. Consistent with the requirements in paragraphs 430 and 431, a bank must retain all relevant information on the borrower absent the guarantee and the guarantor. In the case of retail guarantees, these requirements also apply to the assignment of an exposure to a pool, and the estimation of PD.

482. In no case can the bank assign the guaranteed exposure an adjusted PD or LGD such that the adjusted risk weight would be lower than that of a comparable, direct exposure to the guarantor. Neither criteria nor rating processes are permitted to consider possible favourable effects of imperfect expected correlation between default events for the borrower and guarantor for purposes of regulatory minimum capital requirements. As such, the adjusted risk weight must not reflect the risk mitigation of "double default."

Eligible guarantors and guarantees

483. There are no restrictions on the types of eligible guarantors. The bank must, however, have clearly specified criteria for the types of guarantors it will recognise for regulatory capital purposes.

484. The guarantee must be evidenced in writing, non-cancellable on the part of the guarantor, in force until the debt is satisfied in full (to the extent of the amount and tenor of the guarantee) and legally enforceable against the guarantor in a jurisdiction where the guarantor has assets to attach and enforce a judgement. However, in contrast to the foundation approach to corporate, bank, and sovereign exposures, guarantees prescribing conditions under which the guarantor may not be obliged to perform (conditional guarantees) may be recognised under certain conditions. Specifically, the onus is on the bank to demonstrate that the assignment criteria adequately address any potential reduction in the risk mitigation effect.

Adjustment criteria

485. A bank must have clearly specified criteria for adjusting borrower grades or LGD estimates (or in the case of retail and eligible purchased receivables, the process of allocating exposures to pools) to reflect the impact of guarantees for regulatory capital purposes. These criteria must be as detailed as the criteria for assigning exposures to grades consistent with paragraphs 410 and 411, and must follow all minimum requirements for assigning borrower or facility ratings set out in this document.

486. The criteria must be plausible and intuitive, and must address the guarantor's ability and willingness to perform under the guarantee. The criteria must also address the likely timing of any payments and the degree to which the guarantor's ability to perform under the guarantee is correlated with the borrower's ability to repay. The bank's criteria must also consider the extent to which residual risk to the borrower remains, for example a currency mismatch between the guarantee and the underlying exposure.

487. In adjusting borrower grades or LGD estimates (or in the case of retail and eligible purchased receivables, the process of allocating exposures to pools), banks must take all relevant available information into account.

Credit derivatives

488. The minimum requirements for guarantees are relevant also for single-name credit derivatives. Additional considerations arise in respect of asset mismatches. The criteria used for assigning adjusted borrower grades or LGD estimates (or pools) for exposures hedged with credit derivatives must require that the asset on which the protection is based (the reference asset) cannot be different from the underlying asset, unless the conditions outlined in the foundation approach are met.

489. In addition, the criteria must address the payout structure of the credit derivative and conservatively assess the impact this has on the level and timing of recoveries. The bank must also consider the extent to which other forms of residual risk remain.

For banks using foundation LGD estimates

490. The minimum requirements outlined in paragraphs 480 to 489 apply to banks using the foundation LGD estimates with the following exceptions:

- (1) The bank is not able to use an 'LGD-adjustment' option; and
 - (2) The range of eligible guarantees and guarantors is limited to those outlined in paragraph 302.
- (x) *Requirements specific to estimating PD and LGD (or EL) for qualifying purchased receivables*

491. The following minimum requirements for risk quantification must be satisfied for any purchased receivables (corporate or retail) making use of the top-down treatment of default risk and/or the IRB treatments of dilution risk.

492. The purchasing bank will be required to group the receivables into sufficiently homogeneous pools so that accurate and consistent estimates of PD and LGD (or EL) for default losses and EL estimates of dilution losses can be determined. In general, the risk bucketing process will reflect the seller's underwriting practices and the heterogeneity of its customers. In addition, methods and data for estimating PD, LGD, and EL must comply with the existing risk quantification standards for retail exposures. In particular, quantification should reflect all information available to the purchasing bank regarding the quality of the underlying receivables, including data for similar pools provided by the seller, by the purchasing bank, or by external sources. The purchasing bank must determine whether the data provided by the seller are consistent with expectations agreed upon by both parties concerning, for example, the type, volume and on-going quality of receivables purchased. Where this is not the case, the purchasing bank is expected to obtain and rely upon more relevant data.

Minimum operational requirements

493. A bank purchasing receivables has to justify confidence that current and future advances can be repaid from the liquidation of (or collections against) the receivables pool. To qualify for the top-down treatment of default risk, the receivable pool and overall lending relationship should be closely monitored and controlled. Specifically, a bank will have to demonstrate the following:

Legal certainty

494. The structure of the facility must ensure that under all foreseeable circumstances the bank has effective ownership and control of the cash remittances from the receivables, including incidences of seller or servicer distress and bankruptcy. When the obligor makes payments directly to a seller or servicer, the bank must verify regularly that payments are forwarded completely and within the contractually agreed terms. As well, ownership over the receivables and cash receipts should be protected against bankruptcy 'stays' or legal challenges that could materially delay the lender's ability to liquidate/assign the receivables or retain control over cash receipts.

Effectiveness of monitoring systems

495. The bank must be able to monitor both the quality of the receivables and the financial condition of the seller and servicer. In particular:

- The bank must (a) assess the correlation among the quality of the receivables and the financial condition of both the seller and servicer, and (b) have in place internal policies and procedures that provide adequate safeguards to protect against such contingencies, including the assignment of an internal risk rating for each seller and servicer.
- The bank must have clear and effective policies and procedures for determining seller and servicer eligibility. The bank or its agent must conduct periodic reviews of sellers and servicers in order to verify the accuracy of reports from the seller/servicer, detect fraud or operational weaknesses, and verify the quality of the seller's credit policies and servicer's collection policies and procedures. The findings of these reviews must be well documented.
- The bank must have the ability to assess the characteristics of the receivables pool, including (a) over-advances; (b) history of the seller's arrears, bad debts, and bad debt allowances; (c) payment terms, and (d) potential contra accounts.
- The bank must have effective policies and procedures for monitoring on an aggregate basis single-obligor concentrations both within and across receivables pools.
- The bank must receive timely and sufficiently detailed reports of receivables ageings and dilutions to (a) ensure compliance with the bank's eligibility criteria and advancing policies governing purchased receivables, and (b) provide an effective means with which to monitor and confirm the seller's terms of sale (e.g. invoice date ageing) and dilution.

Effectiveness of work-out systems

496. An effective programme requires systems and procedures not only for detecting deterioration in the seller's financial condition and deterioration in the quality of the receivables at an early stage, but also for addressing emerging problems pro-actively. In particular,

- The bank should have clear and effective policies, procedures, and information systems to monitor compliance with (a) all contractual terms of the facility (including covenants, advancing formulas, concentration limits, early amortisation triggers, etc.) as well as (b) the bank's internal policies governing advance rates and receivables eligibility. The bank's systems should track covenant violations and waivers as well as exceptions to established policies and procedures.
- To limit inappropriate draws, the bank should have effective policies and procedures for detecting, approving, monitoring, and correcting over-advances.
- The bank should have effective policies and procedures for dealing with financially weakened sellers or servicers and/or deterioration in the quality of receivable pools. These include, but are not necessarily limited to, early termination triggers in revolving facilities and other covenant protections, a structured and disciplined approach to dealing with covenant violations, and clear and effective policies and procedures for initiating legal actions and dealing with problem receivables.

Effectiveness of systems for controlling collateral, credit availability, and cash

497. The bank must have clear and effective policies and procedures governing the control of receivables, credit, and cash. In particular,

- Written internal policies must specify all material elements of the receivables purchase programme, including the advancing rates, eligible collateral, necessary documentation, concentration limits, and how cash receipts are to be handled. These elements should take appropriate account of all relevant and material factors, including the seller's/servicer's financial condition, risk concentrations, and trends in the quality of the receivables and the seller's customer base.
- Internal systems must ensure that funds are advanced only against specified supporting collateral and documentation (such as servicer attestations, invoices, shipping documents, etc.).

Compliance with the bank's internal policies and procedures

498. Given the reliance on monitoring and control systems to limit credit risk, the bank should have an effective internal process for assessing compliance with all critical policies and procedures, including

- regular internal and/or external audits of all critical phases of the bank's receivables purchase programme.
- verification of the separation of duties (i) between the assessment of the seller/servicer and the assessment of the obligor and (ii) between the assessment of the seller/servicer and the field audit of the seller/servicer.

499. A bank's effective internal process for assessing compliance with all critical policies and procedures should also include evaluations of back office operations, with particular focus on qualifications, experience, staffing levels, and supporting systems.

8. Validation of internal estimates

500. Banks must have a robust system in place to validate the accuracy and consistency of rating systems, processes, and the estimation of all relevant risk components. A bank must demonstrate to its supervisor that the internal validation process enables it to assess the performance of internal rating and risk estimation systems consistently and meaningfully.

501. Banks must regularly compare realised default rates with estimated PDs for each grade and be able to demonstrate that the realised default rates are within the expected range for that grade. Banks using the advanced IRB approach must complete such analysis for their estimates of LGDs and EADs. Such comparisons must make use of historical data that are over as long a period as possible. The methods and data used in such comparisons by the bank must be clearly documented by the bank. This analysis and documentation must be updated at least annually.

502. Banks must also use other quantitative validation tools and comparisons with relevant external data sources. The analysis must be based on data that are appropriate to the portfolio, are updated regularly, and cover a relevant observation period. Banks' internal assessments of the performance of their own rating systems must be based on long data histories, covering a range of economic conditions, and ideally one or more complete business cycles.

503. Banks must demonstrate that quantitative testing methods and other validation methods do not vary systematically with the economic cycle. Changes in methods and data (both data sources and periods covered) must be clearly and thoroughly documented.

504. Banks must have well-articulated internal standards for situations where deviations in realised PDs, LGDs and EADs from expectations become significant enough to call the validity of the estimates into question. These standards must take account of business cycles and similar systematic variability in default experiences. Where realised values continue to be higher than expected values, banks must revise estimates upward to reflect their default and loss experience.

505. Where banks rely on supervisory, rather than internal, estimates of risk parameters, they are encouraged to compare realised LGDs and EADs to those set by the supervisors. The information on realised LGDs and EADs should form part of the bank's assessment of economic capital.

9. Supervisory LGD and EAD estimates

506. Banks under the foundation IRB approach, which do not meet the requirements for own-estimates of LGD and EAD, above, must meet the minimum requirements described in the standardised approach to receive recognition for eligible financial collateral (as set out in Section II.D: The standardised approach – credit risk mitigation). They must meet the following additional minimum requirements in order to receive recognition for additional collateral types.

(i) Definition of eligibility of CRE and RRE as collateral

507. Eligible CRE and RRE collateral for corporate, sovereign and bank exposures are defined as:

- Collateral where the risk of the borrower is not materially dependent upon the performance of the underlying property or project, but rather on the underlying capacity of the borrower to repay the debt from other sources. As such, repayment

of the facility is not materially dependent on any cash flow generated by the underlying CRE/RRE serving as collateral;⁹² and

- Additionally, the value of the collateral pledged must not be materially dependent on the performance of the borrower. This requirement is not intended to preclude situations where purely macro-economic factors affect both the value of the collateral and the performance of the borrower.

508. In light of the generic description above and the definition of corporate exposures, income producing real estate that falls under the SL asset class is specifically excluded from recognition as collateral for corporate exposures.⁹³

(ii) *Operational requirements for eligible CRE/RRE*

509. Subject to meeting the definition above, CRE and RRE will be eligible for recognition as collateral for corporate claims only if all of the following operational requirements are met.

- *Legal enforceability:* any claim on a collateral taken must be legally enforceable in all relevant jurisdictions, and any claim on collateral must be properly filed on a timely basis. Collateral interests must reflect a perfected lien (i.e. all legal requirements for establishing the claim have been fulfilled). Furthermore, the collateral agreement and the legal process underpinning it must be such that they provide for the bank to realise the value of the collateral within a reasonable timeframe.
- *Objective market value of collateral:* the collateral must be valued at or less than the current fair value under which the property could be sold under private contract between a willing seller and an arm's-length buyer on the date of valuation.
- *Frequent revaluation:* the bank is expected to monitor the value of the collateral on a frequent basis and at a minimum once every year. More frequent monitoring is suggested where the market is subject to significant changes in conditions. Statistical methods of evaluation (e.g. reference to house price indices, sampling) may be used to update estimates or to identify collateral that may have declined in value and that may need re-appraisal. A qualified professional must evaluate the property when information indicates that the value of the collateral may have declined materially relative to general market prices or when a credit event, such as default, occurs.
- *Junior liens:* In some member countries, eligible collateral will be restricted to situations where the lender has a first charge over the property.⁹⁴ Junior liens may be taken into account where there is no doubt that the claim for collateral is legally

⁹² The Committee recognises that in some countries where multifamily housing makes up an important part of the housing market and where public policy is supportive of that sector, including specially established public sector companies as major providers, the risk characteristics of lending secured by mortgage on such residential real estate can be similar to those of traditional corporate exposures. The national supervisor may under such circumstances recognise mortgage on multifamily residential real estate as eligible collateral for corporate exposures.

⁹³ As noted in footnote 73, in exceptional circumstances for well-developed and long-established markets, mortgages on office and/or multi-purpose commercial premises and/or multi-tenanted commercial premises may have the potential to receive recognition as collateral in the corporate portfolio. Please refer to footnote 29 of paragraph 74 for a discussion of the eligibility criteria that would apply.

⁹⁴ In some of these jurisdictions, first liens are subject to the prior right of preferential creditors, such as outstanding tax claims and employees' wages.

enforceable and constitutes an efficient credit risk mitigant. When recognised, junior liens are to be treated using the C*/C** threshold, which is used for senior liens. In such cases, the C* and C** are calculated by taking into account the sum of the junior lien and all more senior liens.

510. Additional collateral management requirements are as follows:

- The types of CRE and RRE collateral accepted by the bank and lending policies (advance rates) when this type of collateral is taken must be clearly documented.
- The bank must take steps to ensure that the property taken as collateral is adequately insured against damage or deterioration.
- The bank must monitor on an ongoing basis the extent of any permissible prior claims (e.g. tax) on the property.
- The bank must appropriately monitor the risk of environmental liability arising in respect of the collateral, such as the presence of toxic material on a property.

(iii) *Requirements for recognition of financial receivables*

Definition of eligible receivables

511. Eligible financial receivables are claims with an original maturity of less than or equal to one year where repayment will occur through the commercial or financial flows related to the underlying assets of the borrower. This includes both self-liquidating debt arising from the sale of goods or services linked to a commercial transaction and general amounts owed by buyers, suppliers, renters, national and local governmental authorities, or other non-affiliated parties not related to the sale of goods or services linked to a commercial transaction. Eligible receivables do not include those associated with securitisations, sub-participations or credit derivatives.

Operational requirements

Legal certainty

512. The legal mechanism by which collateral is given must be robust and ensure that the lender has clear rights over the proceeds from the collateral.

513. Banks must take all steps necessary to fulfil local requirements in respect of the enforceability of security interest, e.g. by registering a security interest with a registrar. There should be a framework that allows the potential lender to have a perfected first priority claim over the collateral.

514. All documentation used in collateralised transactions must be binding on all parties and legally enforceable in all relevant jurisdictions. Banks must have conducted sufficient legal review to verify this and have a well founded legal basis to reach this conclusion, and undertake such further review as necessary to ensure continuing enforceability.

515. The collateral arrangements must be properly documented, with a clear and robust procedure for the timely collection of collateral proceeds. Banks' procedures should ensure that any legal conditions required for declaring the default of the customer and timely collection of collateral are observed. In the event of the obligor's financial distress or default, the bank should have legal authority to sell or assign the receivables to other parties without consent of the receivables' obligors.

Risk management

516. The bank must have a sound process for determining the credit risk in the receivables. Such a process should include, among other things, analyses of the borrower's business and industry (e.g. effects of the business cycle) and the types of customers with whom the borrower does business. Where the bank relies on the borrower to ascertain the credit risk of the customers, the bank must review the borrower's credit policy to ascertain its soundness and credibility.

517. The margin between the amount of the exposure and the value of the receivables must reflect all appropriate factors, including the cost of collection, concentration within the receivables pool pledged by an individual borrower, and potential concentration risk within the bank's total exposures.

518. The bank must maintain a continuous monitoring process that is appropriate for the specific exposures (either immediate or contingent) attributable to the collateral to be utilised as a risk mitigant. This process may include, as appropriate and relevant, ageing reports, control of trade documents, borrowing base certificates, frequent audits of collateral, confirmation of accounts, control of the proceeds of accounts paid, analyses of dilution (credits given by the borrower to the issuers) and regular financial analysis of both the borrower and the issuers of the receivables, especially in the case when a small number of large-sized receivables are taken as collateral. Observance of the bank's overall concentration limits should be monitored. Additionally, compliance with loan covenants, environmental restrictions, and other legal requirements should be reviewed on a regular basis.

519. The receivables pledged by a borrower should be diversified and not be unduly correlated with the borrower. Where the correlation is high, e.g. where some issuers of the receivables are reliant on the borrower for their viability or the borrower and the issuers belong to a common industry, the attendant risks should be taken into account in the setting of margins for the collateral pool as a whole. Receivables from affiliates of the borrower (including subsidiaries and employees) will not be recognised as risk mitigants.

520. The bank should have a documented process for collecting receivable payments in distressed situations. The requisite facilities for collection should be in place, even when the bank normally looks to the borrower for collections.

Requirements for recognition of other collateral

521. Supervisors may allow for recognition of the credit risk mitigating effect of certain other physical collateral. Each supervisor will determine which, if any, collateral types in its jurisdiction meet the following two standards:

- Existence of liquid markets for disposal of collateral in an expeditious and economically efficient manner.
- Existence of well established, publicly available market prices for the collateral. Supervisors will seek to ensure that the amount a bank receives when collateral is realised does not deviate significantly from these market prices.

522. In order for a given bank to receive recognition for additional physical collateral, it must meet all the standards in paragraphs 509 and 510, subject to the following modifications.

- First Claim: With the sole exception of permissible prior claims specified in footnote 94, only first liens on, or charges over, collateral are permissible. As such, the bank must have priority over all other lenders to the realised proceeds of the collateral.

- The loan agreement must include detailed descriptions of the collateral plus detailed specifications of the manner and frequency of revaluation.
- The types of physical collateral accepted by the bank and policies and practices in respect of the appropriate amount of each type of collateral relative to the exposure amount must be clearly documented in internal credit policies and procedures and available for examination and/or audit review.
- Bank credit policies with regard to the transaction structure must address appropriate collateral requirements relative to the exposure amount, the ability to liquidate the collateral readily, the ability to establish objectively a price or market value, the frequency with which the value can readily be obtained (including a professional appraisal or valuation), and the volatility of the value of the collateral. The periodic revaluation process must pay particular attention to “fashion-sensitive” collateral to ensure that valuations are appropriately adjusted downward of fashion, or model-year, obsolescence as well as physical obsolescence or deterioration.
- In cases of inventories (e.g. raw materials, work-in-process, finished goods, dealers’ inventories of autos) and equipment, the periodic revaluation process must include physical inspection of the collateral.

10. Requirements for recognition of leasing

523. Leases other than those that expose the bank to residual value risk (see paragraph 524) will be accorded the same treatment as exposures collateralised by the same type of collateral. The minimum requirements for the collateral type must be met (CRE/RRE or other collateral). In addition, the bank must also meet the following standards:

- Robust risk management on the part of the lessor with respect to the location of the asset, the use to which it is put, its age, and planned obsolescence;
- A robust legal framework establishing the lessor’s legal ownership of the asset and its ability to exercise its rights as owner in a timely fashion; and
- The difference between the rate of depreciation of the physical asset and the rate of amortisation of the lease payments must not be so large as to overstate the CRM attributed to the leased assets.

524. Leases that expose the bank to residual value risk will be treated in the following manner. Residual value risk is the bank’s exposure to potential loss due to the fair value of the equipment declining below its residual estimate at lease inception.

- The discounted lease payment stream will receive a risk weight appropriate for the lessee’s financial strength (PD) and supervisory or own-estimate of LGD, which ever is appropriate.
- The residual value will be risk-weighted at 100%.

11. Calculation of capital charges for equity exposures

(i) The internal models market-based approach

525. To be eligible for the internal models market-based approach a bank must demonstrate to its supervisor that it meets certain quantitative and qualitative minimum requirements at the outset and on an ongoing basis. A bank that fails to demonstrate continued compliance with the minimum requirements must develop a plan for rapid return to compliance, obtain its supervisor’s approval of the plan, and implement that plan in a timely fashion. In the interim, banks would be expected to compute capital charges using a simple risk weight approach.

526. The Committee recognises that differences in markets, measurement methodologies, equity investments and management practices require banks and supervisors to customise their operational procedures. It is not the Committee's intention to dictate the form or operational detail of banks' risk management policies and measurement practices for their banking book equity holdings. However, some of the minimum requirements are specific. Each supervisor will develop detailed examination procedures to ensure that banks' risk measurement systems and management controls are adequate to serve as the basis for the internal models approach.

(ii) *Capital charge and risk quantification*

527. The following minimum quantitative standards apply for the purpose of calculating minimum capital charges under the internal models approach.

- (a) The capital charge is equivalent to the potential loss on the institution's equity portfolio arising from an assumed instantaneous shock equivalent to the 99th percentile, one-tailed confidence interval of the difference between quarterly returns and an appropriate risk-free rate computed over a long-term sample period.
- (b) The estimated losses should be robust to adverse market movements relevant to the long-term risk profile of the institution's specific holdings. The data used to represent return distributions should reflect the longest sample period for which data are available and meaningful in representing the risk profile of the bank's specific equity holdings. The data used should be sufficient to provide conservative, statistically reliable and robust loss estimates that are not based purely on subjective or judgmental considerations. Institutions must demonstrate to supervisors that the shock employed provides a conservative estimate of potential losses over a relevant long-term market or business cycle. Models estimated using data not reflecting realistic ranges of long-run experience, including a period of reasonably severe declines in equity market values relevant to a bank's holdings, are presumed to produce optimistic results unless there is credible evidence of appropriate adjustments built into the model. In the absence of built-in adjustments, the bank must combine empirical analysis of available data with adjustments based on a variety of factors in order to attain model outputs that achieve appropriate realism and conservatism. In constructing Value at Risk (VaR) models estimating potential quarterly losses, institutions may use quarterly data or convert shorter horizon period data to a quarterly equivalent using an analytically appropriate method supported by empirical evidence. Such adjustments must be applied through a well-developed and well-documented thought process and analysis. In general, adjustments must be applied conservatively and consistently over time. Furthermore, where only limited data are available, or where technical limitations are such that estimates from any single method will be of uncertain quality, banks must add appropriate margins of conservatism in order to avoid over-optimism.
- (c) No particular type of VaR model (e.g. variance-covariance, historical simulation, or Monte Carlo) is prescribed. However, the model used must be able to capture adequately all of the material risks embodied in equity returns including both the general market risk and specific risk exposure of the institution's equity portfolio. Internal models must adequately explain historical price variation, capture both the magnitude and changes in the composition of potential concentrations, and be robust to adverse market environments. The population of risk exposures represented in the data used for estimation must be closely matched to or at least comparable with those of the bank's equity exposures.

- (d) Banks may also use modelling techniques such as historical scenario analysis to determine minimum capital requirements for banking book equity holdings. The use of such models is conditioned upon the institution demonstrating to its supervisor that the methodology and its output can be quantified in the form of the loss percentile specified under (a).
- (e) Institutions must use an internal model that is appropriate for the risk profile and complexity of their equity portfolio. Institutions with material holdings with values that are highly non-linear in nature (e.g. equity derivatives, convertibles) must employ an internal model designed to capture appropriately the risks associated with such instruments.
- (f) Subject to supervisory review, equity portfolio correlations can be integrated into a bank's internal risk measures. The use of explicit correlations (e.g. utilisation of a variance/covariance VaR model) must be fully documented and supported using empirical analysis. The appropriateness of implicit correlation assumptions will be evaluated by supervisors in their review of model documentation and estimation techniques.
- (g) Mapping of individual positions to proxies, market indices, and risk factors should be plausible, intuitive, and conceptually sound. Mapping techniques and processes should be fully documented, and demonstrated with both theoretical and empirical evidence to be appropriate for the specific holdings. Where professional judgement is combined with quantitative techniques in estimating a holding's return volatility, the judgement must take into account the relevant and material information not considered by the other techniques utilised.
- (h) Where factor models are used, either single or multi-factor models are acceptable depending upon the nature of an institution's holdings. Banks are expected to ensure that the factors are sufficient to capture the risks inherent in the equity portfolio. Risk factors should correspond to the appropriate equity market characteristics (for example, public, private, market capitalisation industry sectors and sub-sectors, operational characteristics) in which the bank holds significant positions. While banks will have discretion in choosing the factors, they must demonstrate through empirical analyses the appropriateness of those factors, including their ability to cover both general and specific risk.
- (i) Estimates of the return volatility of equity investments must incorporate relevant and material available data, information, and methods. A bank may utilise independently reviewed internal data or data from external sources (including pooled data). The number of risk exposures in the sample, and the data period used for quantification must be sufficient to provide the bank with confidence in the accuracy and robustness of its estimates. Institutions should take appropriate measures to limit the potential of both sampling bias and survivorship bias in estimating return volatilities.
- (j) A rigorous and comprehensive stress-testing programme must be in place. Banks are expected to subject their internal model and estimation procedures, including volatility computations, to either hypothetical or historical scenarios that reflect worst-case losses given underlying positions in both public and private equities. At a minimum, stress tests should be employed to provide information about the effect of tail events beyond the level of confidence assumed in the internal models approach.

(iii) *Risk management process and controls*

528. Banks' overall risk management practices used to manage their banking book equity investments are expected to be consistent with the evolving sound practice guidelines issued by the Committee and national supervisors. With regard to the development and use of internal models for capital purposes, institutions must have established policies, procedures, and controls to ensure the integrity of the model and modelling process used to derive regulatory capital standards. These policies, procedures, and controls should include the following:

- (a) Full integration of the internal model into the overall management information systems of the institution and in the management of the banking book equity portfolio. Internal models should be fully integrated into the institution's risk management infrastructure including use in: (i) establishing investment hurdle rates and evaluating alternative investments; (ii) measuring and assessing equity portfolio performance (including the risk-adjusted performance); and (iii) allocating economic capital to equity holdings and evaluating overall capital adequacy as required under Pillar 2. The institution should be able to demonstrate, through for example, investment committee minutes, that internal model output plays an essential role in the investment management process.
- (b) Established management systems, procedures, and control functions for ensuring the periodic and independent review of all elements of the internal modelling process, including approval of model revisions, vetting of model inputs, and review of model results, such as direct verification of risk computations. Proxy and mapping techniques and other critical model components should receive special attention. These reviews should assess the accuracy, completeness, and appropriateness of model inputs and results and focus on both finding and limiting potential errors associated with known weaknesses and identifying unknown model weaknesses. Such reviews may be conducted as part of internal or external audit programmes, by an independent risk control unit, or by an external third party.
- (c) Adequate systems and procedures for monitoring investment limits and the risk exposures of equity investments.
- (d) The units responsible for the design and application of the model must be functionally independent from the units responsible for managing individual investments.
- (e) Parties responsible for any aspect of the modelling process must be adequately qualified. Management must allocate sufficient skilled and competent resources to the modelling function.

(iv) *Validation and documentation*

529. Institutions employing internal models for regulatory capital purposes are expected to have in place a robust system to validate the accuracy and consistency of the model and its inputs. They must also fully document all material elements of their internal models and modelling process. The modelling process itself as well as the systems used to validate internal models including all supporting documentation, validation results, and the findings of internal and external reviews are subject to oversight and review by the bank's supervisor.

Validation

530. Banks must have a robust system in place to validate the accuracy and consistency of their internal models and modelling processes. A bank must demonstrate to its supervisor

that the internal validation process enables it to assess the performance of its internal model and processes consistently and meaningfully.

531. Banks must regularly compare actual return performance (computed using realised and unrealised gains and losses) with modelled estimates and be able to demonstrate that such returns are within the expected range for the portfolio and individual holdings. Such comparisons must make use of historical data that are over as long a period as possible. The methods and data used in such comparisons must be clearly documented by the bank. This analysis and documentation should be updated at least annually.

532. Banks should make use of other quantitative validation tools and comparisons with external data sources. The analysis must be based on data that are appropriate to the portfolio, are updated regularly, and cover a relevant observation period. Banks' internal assessments of the performance of their own model must be based on long data histories, covering a range of economic conditions, and ideally one or more complete business cycles.

533. Banks must demonstrate that quantitative validation methods and data are consistent through time. Changes in estimation methods and data (both data sources and periods covered) must be clearly and thoroughly documented.

534. Since the evaluation of actual performance to expected performance over time provides a basis for banks to refine and adjust internal models on an ongoing basis, it is expected that banks using internal models will have established well-articulated model review standards. These standards are especially important for situations where actual results significantly deviate from expectations and where the validity of the internal model is called into question. These standards must take account of business cycles and similar systematic variability in equity returns. All adjustments made to internal models in response to model reviews must be well documented and consistent with the bank's model review standards.

535. To facilitate model validation through backtesting on an ongoing basis, institutions using the internal model approach must construct and maintain appropriate databases on the actual quarterly performance of their equity investments as well on the estimates derived using their internal models. Institutions should also backtest the volatility estimates used within their internal models and the appropriateness of the proxies used in the model. Supervisors may ask banks to scale their quarterly forecasts to a different, in particular shorter, time horizon, store performance data for this time horizon and perform backtests on this basis.

Documentation

536. The burden is on the bank to satisfy its supervisor that a model has good predictive power and that regulatory capital requirements will not be distorted as a result of its use. Accordingly, all critical elements of an internal model and the modelling process should be fully and adequately documented. Banks must document in writing their internal model's design and operational details. The documentation should demonstrate banks' compliance with the minimum quantitative and qualitative standards, and should address topics such as the application of the model to different segments of the portfolio, estimation methodologies, responsibilities of parties involved in the modelling, and the model approval and model review processes. In particular, the documentation should address the following points:

- (a) A bank must document the rationale for its choice of internal modelling methodology and must be able to provide analyses demonstrating that the model and modelling procedures are likely to result in estimates that meaningfully identify the risk of the bank's equity holdings. Internal models and procedures must be periodically

reviewed to determine whether they remain fully applicable to the current portfolio and to external conditions. In addition, a bank must document a history of major changes in the model over time and changes made to the modelling process subsequent to the last supervisory review. If changes have been made in response to the bank's internal review standards, the bank must document that these changes are consistent with its internal model review standards.

- (b) In documenting their internal models banks should:
- provide a detailed outline of the theory, assumptions and/or mathematical and empirical basis of the parameters, variables, and data source(s) used to estimate the model;
 - establish a rigorous statistical process (including out-of-time and out-of-sample performance tests) for validating the selection of explanatory variables; and
 - indicate circumstances under which the model does not work effectively.
- (c) Where proxies and mapping are employed, institutions must have performed and documented rigorous analysis demonstrating that all chosen proxies and mappings are sufficiently representative of the risk of the equity holdings to which they correspond. The documentation should show, for instance, the relevant and material factors (e.g. business lines, balance sheet characteristics, geographic location, company age, industry sector and subsector, operating characteristics) used in mapping individual investments into proxies. In summary, institutions must demonstrate that the proxies and mappings employed:
- are adequately comparable to the underlying holding or portfolio;
 - are derived using historical economic and market conditions that are relevant and material to the underlying holdings or, where not, that an appropriate adjustment has been made; and,
 - are robust estimates of the potential risk of the underlying holding.

12. Disclosure requirements

537. In order to be eligible for the IRB approach, banks must meet the disclosure requirements set out in Pillar 3. These are minimum requirements for use of IRB: failure to meet these will render banks ineligible to use the relevant IRB approach.

IV. Credit Risk — Securitisation Framework

A. Scope and definitions of transactions covered under the securitisation framework

538. Banks must apply the securitisation framework for determining regulatory capital requirements on exposures arising from traditional and synthetic securitisations or similar structures that contain features common to both. Since securitisations may be structured in many different ways, the capital treatment of a securitisation exposure must be determined on the basis of its economic substance rather than its legal form. Similarly, supervisors will look to the economic substance of a transaction to determine whether it should be subject to the securitisation framework for purposes of determining regulatory capital. Banks are encouraged to consult with their national supervisors when there is uncertainty about whether a given transaction should be considered a securitisation. For example, transactions involving cash flows from real estate (e.g. rents) may be considered specialised lending exposures, if warranted.

539. A *traditional securitisation* is a structure where the cash flow from an underlying pool of exposures is used to service at least two different stratified risk positions or tranches reflecting different degrees of credit risk. Payments to the investors depend upon the performance of the specified underlying exposures, as opposed to being derived from an obligation of the entity originating those exposures. The stratified/tranched structures that characterise securitisations differ from ordinary senior/subordinated debt instruments in that junior securitisation tranches can absorb losses without interrupting contractual payments to more senior tranches, whereas subordination in a senior/subordinated debt structure is a matter of priority of rights to the proceeds of liquidation.

540. A *synthetic securitisation* is a structure with at least two different stratified risk positions or tranches that reflect different degrees of credit risk where credit risk of an underlying pool of exposures is transferred, in whole or in part, through the use of funded (e.g. credit-linked notes) or unfunded (e.g. credit default swaps) credit derivatives or guarantees that serve to hedge the credit risk of the portfolio. Accordingly, the investors' potential risk is dependent upon the performance of the underlying pool.

541. Banks' exposures to a securitisation are hereafter referred to as "securitisation exposures". Securitisation exposures can include but are not restricted to the following: asset-backed securities, mortgage-backed securities, credit enhancements, liquidity facilities, interest rate or currency swaps, credit derivatives and tranching cover as described in paragraph 199. Reserve accounts, such as cash collateral accounts, recorded as an asset by the originating bank must also be treated as securitisation exposures.

542. Underlying instruments in the pool being securitised may include but are not restricted to the following: loans, commitments, asset-backed and mortgage-backed securities, corporate bonds, equity securities, and private equity investments. The underlying pool may include one or more exposures.

B. Definitions and general terminology

1. Originating bank

543. For risk-based capital purposes, a bank is considered to be an originator with regard to a certain securitisation if it meets either of the following conditions:

- (a) The bank originates directly or indirectly underlying exposures included in the securitisation; or

- (b) The bank serves as a sponsor of an asset-backed commercial paper (ABCP) conduit or similar programme that acquires exposures from third-party entities. In the context of such programmes, a bank would generally be considered a sponsor and, in turn, an originator if it, in fact or in substance, manages or advises the programme, places securities into the market, or provides liquidity and/or credit enhancements.

2. *Asset-backed commercial paper (ABCP) programme*

544. An asset-backed commercial paper (ABCP) programme predominately issues commercial paper with an original maturity of one year or less that is backed by assets or other exposures held in a bankruptcy-remote, special purpose entity.

3. *Clean-up call*

545. A clean-up call is an option that permits the securitisation exposures (e.g. asset-backed securities) to be called before all of the underlying exposures or securitisation exposures have been repaid. In the case of traditional securitisations, this is generally accomplished by repurchasing the remaining securitisation exposures once the pool balance or outstanding securities have fallen below some specified level. In the case of a synthetic transaction, the clean-up call may take the form of a clause that extinguishes the credit protection.

4. *Credit enhancement*

546. A credit enhancement is a contractual arrangement in which the bank retains or assumes a securitisation exposure and, in substance, provides some degree of added protection to other parties to the transaction.

5. *Credit-enhancing interest-only strip*

547. A credit-enhancing interest-only strip (*I/O*) is an on-balance sheet asset that (i) represents a valuation of cash flows related to future margin income, and (ii) is subordinated.

6. *Early amortisation*

548. Early amortisation provisions are mechanisms that, once triggered, allow investors to be paid out prior to the originally stated maturity of the securities issued. For risk-based capital purposes, an early amortisation provision will be considered either controlled or non-controlled. A controlled early amortisation provision must meet all of the following conditions.

- (a) The bank must have an appropriate capital/liquidity plan in place to ensure that it has sufficient capital and liquidity available in the event of an early amortisation.
- (b) Throughout the duration of the transaction, including the amortisation period, there is the same pro rata sharing of interest, principal, expenses, losses and recoveries based on the bank's and investors' relative shares of the receivables outstanding at the beginning of each month.
- (c) The bank must set a period for amortisation that would be sufficient for at least 90% of the total debt outstanding at the beginning of the early amortisation period to have been repaid or recognised as in default; and

- (d) The pace of repayment should not be any more rapid than would be allowed by straight-line amortisation over the period set out in criterion (c).

549. An early amortisation provision that does not satisfy the conditions for a controlled early amortisation provision will be treated as a non-controlled early amortisation provision.

7. Excess spread

550. Excess spread is generally defined as gross finance charge collections and other income received by the trust or special purpose entity (SPE, specified in paragraph 552) minus certificate interest, servicing fees, charge-offs, and other senior trust or SPE expenses.

8. Implicit support

551. Implicit support arises when a bank provides support to a securitisation in excess of its predetermined contractual obligation.

9. Special purpose entity (SPE)

552. An SPE is a corporation, trust, or other entity organised for a specific purpose, the activities of which are limited to those appropriate to accomplish the purpose of the SPE, and the structure of which is intended to isolate the SPE from the credit risk of an originator or seller of exposures. SPEs are commonly used as financing vehicles in which exposures are sold to a trust or similar entity in exchange for cash or other assets funded by debt issued by the trust.

C. Operational requirements for the recognition of risk transference

553. The following operational requirements are applicable to both the standardised and IRB approaches of the securitisation framework.

1. Operational requirements for traditional securitisations

554. An originating bank may exclude securitised exposures from the calculation of risk-weighted assets only if all of the following conditions have been met. Banks meeting these conditions must still hold regulatory capital against any securitisation exposures they retain.

- (a) Significant credit risk associated with the securitised exposures has been transferred to third parties.
- (b) The transferor does not maintain effective or indirect control over the transferred exposures. The assets are legally isolated from the transferor in such a way (e.g. through the sale of assets or through subparticipation) that the exposures are put beyond the reach of the transferor and its creditors, even in bankruptcy or receivership. These conditions must be supported by an opinion provided by a qualified legal counsel.

The transferor is deemed to have maintained effective control over the transferred credit risk exposures if it: (i) is able to repurchase from the transferee the previously transferred exposures in order to realise their benefits; or (ii) is obligated to retain the risk of the transferred exposures. The transferor's retention of servicing rights to the exposures will not necessarily constitute indirect control of the exposures.

- (c) The securities issued are not obligations of the transferor. Thus, investors who purchase the securities only have claim to the underlying pool of exposures.
- (d) The transferee is an SPE and the holders of the beneficial interests in that entity have the right to pledge or exchange them without restriction.
- (e) Clean-up calls must satisfy the conditions set out in paragraph 557.
- (f) The securitisation does not contain clauses that (i) require the originating bank to alter systematically the underlying exposures such that the pool's weighted average credit quality is improved unless this is achieved by selling assets to independent and unaffiliated third parties at market prices; (ii) allow for increases in a retained first loss position or credit enhancement provided by the originating bank after the transaction's inception; or (iii) increase the yield payable to parties other than the originating bank, such as investors and third-party providers of credit enhancements, in response to a deterioration in the credit quality of the underlying pool.

2. Operational requirements for synthetic securitisations

555. For synthetic securitisations, the use of CRM techniques (i.e. collateral, guarantees and credit derivatives) for hedging the underlying exposure may be recognised for risk-based capital purposes only if the conditions outlined below are satisfied:

- (a) Credit risk mitigants must comply with the requirements as set out in Section II.D of this Framework.
- (b) Eligible collateral is limited to that specified in paragraphs 145 and 146. Eligible collateral pledged by SPEs may be recognised.
- (c) Eligible guarantors are defined in paragraph 195. Banks may not recognise SPEs as eligible guarantors in the securitisation framework.
- (d) Banks must transfer significant credit risk associated with the underlying exposure to third parties.
- (e) The instruments used to transfer credit risk may not contain terms or conditions that limit the amount of credit risk transferred, such as those provided below:
 - Clauses that materially limit the credit protection or credit risk transference (e.g. significant materiality thresholds below which credit protection is deemed not to be triggered even if a credit event occurs or those that allow for the termination of the protection due to deterioration in the credit quality of the underlying exposures);
 - Clauses that require the originating bank to alter the underlying exposures to improve the pool's weighted average credit quality;
 - Clauses that increase the banks' cost of credit protection in response to deterioration in the pool's quality;
 - Clauses that increase the yield payable to parties other than the originating bank, such as investors and third-party providers of credit enhancements, in response to a deterioration in the credit quality of the reference pool; and
 - Clauses that provide for increases in a retained first loss position or credit enhancement provided by the originating bank after the transaction's inception.

- (f) An opinion must be obtained from a qualified legal counsel that confirms the enforceability of the contracts in all relevant jurisdictions.
- (g) Clean-up calls must satisfy the conditions set out in paragraph 557.

556. For synthetic securitisations, the effect of applying CRM techniques for hedging the underlying exposure are treated according to paragraphs 109 to 210. In case there is a maturity mismatch, the capital requirement will be determined in accordance with paragraphs 202 to 205. When the exposures in the underlying pool have different maturities, the longest maturity must be taken as the maturity of the pool. Maturity mismatches may arise in the context of synthetic securitisations when, for example, a bank uses credit derivatives to transfer part or all of the credit risk of a specific pool of assets to third parties. When the credit derivatives unwind, the transaction will terminate. This implies that the effective maturity of the tranches of the synthetic securitisation may differ from that of the underlying exposures. Originating banks of synthetic securitisations must treat such maturity mismatches in the following manner. A bank using the standardised approach for securitisation must deduct all retained positions that are unrated or rated below investment grade. A bank using the IRB approach must deduct unrated, retained positions if the treatment of the position is deduction specified in paragraphs 609 to 643. Accordingly, when deduction is required, maturity mismatches are not taken into account. For all other securitisation exposures, the bank must apply the maturity mismatch treatment set forth in paragraphs 202 to 205.

3. Operational requirements and treatment of clean-up calls

557. For securitisation transactions that include a clean-up call, no capital will be required due to the presence of a clean-up call if the following conditions are met: (i) the exercise of the clean-up call must not be mandatory, in form or in substance, but rather must be at the discretion of the originating bank; (ii) the clean-up call must not be structured to avoid allocating losses to credit enhancements or positions held by investors or otherwise structured to provide credit enhancement; and (iii) the clean-up call must only be exercisable when 10% or less of the original underlying portfolio, or securities issued remain, or, for synthetic securitisations, when 10% or less of the original reference portfolio value remains.

558. Securitisation transactions that include a clean-up call that does not meet all of the criteria stated in paragraph 557 result in a capital requirement for the originating bank. For a traditional securitisation, the underlying exposures must be treated as if they were not securitised. Additionally, banks must not recognise in regulatory capital any gain-on-sale, as defined in paragraph 562. For synthetic securitisations, the bank purchasing protection must hold capital against the entire amount of the securitised exposures as if they did not benefit from any credit protection. If a synthetic securitisation incorporates a call (other than a clean-up call) that effectively terminates the transaction and the purchased credit protection on a specific date, the bank must treat the transaction in accordance with paragraph 556 and paragraphs 202 to 205.

559. If a clean-up call, when exercised, is found to serve as a credit enhancement, the exercise of the clean-up call must be considered a form of implicit support provided by the bank and must be treated in accordance with the supervisory guidance pertaining to securitisation transactions.

D. Treatment of securitisation exposures

1. Calculation of capital requirements

560. Banks are required to hold regulatory capital against all of their securitisation exposures, including those arising from the provision of credit risk mitigants to a securitisation transaction, investments in asset-backed securities, retention of a subordinated tranche, and extension of a liquidity facility or credit enhancement, as set forth in the following sections. Repurchased securitisation exposures must be treated as retained securitisation exposures.

(i) Deduction

561. When a bank is required to deduct a securitisation exposure from regulatory capital, the deduction must be taken 50% from Tier 1 and 50% from Tier 2 with the one exception noted in paragraph 562. Credit enhancing I/Os (net of the amount that must be deducted from Tier 1 as in paragraph 562) are deducted 50% from Tier 1 and 50% from Tier 2. Deductions from capital may be calculated net of any specific provisions taken against the relevant securitisation exposures.

562. Banks must deduct from Tier 1 any increase in equity capital resulting from a securitisation transaction, such as that associated with expected future margin income (FMI) resulting in a gain-on-sale that is recognised in regulatory capital. Such an increase in capital is referred to as a “gain-on-sale” for the purposes of the securitisation framework.

563. For the purposes of the EL-provision calculation as set out in Section III.G, securitisation exposures do not contribute to the EL amount. Similarly, any specific provisions against securitisation exposures are not to be included in the measurement of eligible provisions.

(ii) Implicit support

564. When a bank provides implicit support to a securitisation, it must, at a minimum, hold capital against all of the exposures associated with the securitisation transaction as if they had not been securitised. Additionally, banks would not be permitted to recognise in regulatory capital any gain-on-sale, as defined in paragraph 562. Furthermore, the bank is required to disclose publicly that (a) it has provided non-contractual support and (b) the capital impact of doing so.

2. Operational requirements for use of external credit assessments

565. The following operational criteria concerning the use of external credit assessments apply in the standardised and IRB approaches of the securitisation framework:

- (a) To be eligible for risk-weighting purposes, the external credit assessment must take into account and reflect the entire amount of credit risk exposure the bank has with regard to all payments owed to it. For example, if a bank is owed both principal and interest, the assessment must fully take into account and reflect the credit risk associated with timely repayment of both principal and interest.
- (b) The external credit assessments must be from an eligible ECAI as recognised by the bank’s national supervisor in accordance with paragraphs 90 to 108 with the following exception. In contrast with bullet three of paragraph 91, an eligible credit assessment must be publicly available. In other words, a rating must be published in an accessible form and included in the ECAI’s transition matrix. Consequently,

ratings that are made available only to the parties to a transaction do not satisfy this requirement.

- (c) Eligible ECAs must have a demonstrated expertise in assessing securitisations, which may be evidenced by strong market acceptance.
- (d) A bank must apply external credit assessments from eligible ECAs consistently across a given type of securitisation exposure. Furthermore, a bank cannot use the credit assessments issued by one ECA for one or more tranches and those of another ECA for other positions (whether retained or purchased) within the same securitisation structure that may or may not be rated by the first ECA. Where two or more eligible ECAs can be used and these assess the credit risk of the same securitisation exposure differently, paragraphs 96 to 98 will apply.
- (e) Where CRM is provided directly to an SPE by an eligible guarantor defined in paragraph 195 and is reflected in the external credit assessment assigned to a securitisation exposure(s), the risk weight associated with that external credit assessment should be used. In order to avoid any double counting, no additional capital recognition is permitted. If the CRM provider is not recognised as an eligible guarantor in paragraph 195, the covered securitisation exposures should be treated as unrated.
- (f) In the situation where a credit risk mitigant is not obtained by the SPE but rather applied to a specific securitisation exposure within a given structure (e.g. ABS tranche), the bank must treat the exposure as if it is unrated and then use the CRM treatment outlined in Section II.D or in the foundation IRB approach of Section III, to recognise the hedge.

3. *Standardised approach for securitisation exposures*

(i) Scope

566. Banks that apply the standardised approach to credit risk for the type of underlying exposure(s) securitised must use the standardised approach under the securitisation framework.

(ii) Risk weights

567. The risk-weighted asset amount of a securitisation exposure is computed by multiplying the amount of the position by the appropriate risk weight determined in accordance with the following tables. For off-balance sheet exposures, banks must apply a CCF and then risk weight the resultant credit equivalent amount. If such an exposure is rated, a CCF of 100% must be applied. For positions with long-term ratings of B+ and below and short-term ratings other than A-1/P-1, A-2/P-2, A-3/P-3, deduction from capital as defined in paragraph 561 is required. Deduction is also required for unrated positions with the exception of the circumstances described in paragraphs 571 to 575.

Long-term rating category⁹⁵

External Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	B+ and below or unrated
Risk Weight	20%	50%	100%	350%	Deduction

Short-term rating category

External Credit Assessment	A-1/P-1	A-2/P-2	A-3/P-3	All other ratings or unrated
Risk Weight	20%	50%	100%	Deduction

568. The capital treatment of positions retained by originators, liquidity facilities, credit risk mitigants, and securitisations of revolving exposures are identified separately. The treatment of clean-up calls is provided in paragraphs 557 to 559.

Investors may recognise ratings on below-investment grade exposures

569. Only third-party investors, as opposed to banks that serve as originators, may recognise external credit assessments that are equivalent to BB+ to BB- for risk weighting purposes of securitisation exposures.

Originators to deduct below-investment grade exposures

570. Originating banks as defined in paragraph 543 must deduct all retained securitisation exposures rated below investment grade (i.e. BBB-).

(iii) Exceptions to general treatment of unrated securitisation exposures

571. As noted in the tables above, unrated securitisation exposures must be deducted with the following exceptions: (i) the most senior exposure in a securitisation, (ii) exposures that are in a second loss position or better in ABCP programmes and meet the requirements outlined in paragraph 574, and (iii) eligible liquidity facilities.

Treatment of unrated most senior securitisation exposures

572. If the most senior exposure in a securitisation of a traditional or synthetic securitisation is unrated, a bank that holds or guarantees such an exposure may determine the risk weight by applying the “look-through” treatment, provided the composition of the underlying pool is known at all times. Banks are not required to consider interest rate or currency swaps when determining whether an exposure is the most senior in a securitisation for the purpose of applying the “look-through” approach.

573. In the look-through treatment, the unrated most senior position receives the average risk weight of the underlying exposures subject to supervisory review. Where the bank is

⁹⁵ The rating designations used in the following charts are for illustrative purposes only and do not indicate any preference for, or endorsement of, any particular external assessment system.

unable to determine the risk weights assigned to the underlying credit risk exposures, the unrated position must be deducted.

Treatment of exposures in a second loss position or better in ABCP programmes

574. Deduction is not required for those unrated securitisation exposures provided by sponsoring banks to ABCP programmes that satisfy the following requirements:

- (a) The exposure is economically in a second loss position or better and the first loss position provides significant credit protection to the second loss position;
- (b) The associated credit risk is the equivalent of investment grade or better; and
- (c) The bank holding the unrated securitisation exposure does not retain or provide the first loss position.

575. Where these conditions are satisfied, the risk weight is the greater of (i) 100% or (ii) the highest risk weight assigned to any of the underlying individual exposures covered by the facility.

Risk weights for eligible liquidity facilities

576. For eligible liquidity facilities as defined in paragraph 578 and where the conditions for use of external credit assessments in paragraph 565 are not met, the risk weight applied to the exposure's credit equivalent amount is equal to the highest risk weight assigned to any of the underlying individual exposures covered by the facility.

(iv) Credit conversion factors for off-balance sheet exposures

577. For risk-based capital purposes, banks must determine whether, according to the criteria outlined below, an off-balance sheet securitisation exposure qualifies as an 'eligible liquidity facility' or an 'eligible servicer cash advance facility'. All other off-balance sheet securitisation exposures will receive a 100% CCF.

Eligible liquidity facilities

578. Banks are permitted to treat off-balance sheet securitisation exposures as eligible liquidity facilities if the following minimum requirements are satisfied:

- (a) The facility documentation must clearly identify and limit the circumstances under which it may be drawn. Draws under the facility must be limited to the amount that is likely to be repaid fully from the liquidation of the underlying exposures and any seller-provided credit enhancements. In addition, the facility must not cover any losses incurred in the underlying pool of exposures prior to a draw, or be structured such that draw-down is certain (as indicated by regular or continuous draws);
- (b) The facility must be subject to an asset quality test that precludes it from being drawn to cover credit risk exposures that are in default as defined in paragraphs 452 to 459. In addition, if the exposures that a liquidity facility is required to fund are externally rated securities, the facility can only be used to fund securities that are externally rated investment grade at the time of funding;
- (c) The facility cannot be drawn after all applicable (e.g. transaction-specific and programme-wide) credit enhancements from which the liquidity would benefit have been exhausted; and

- (d) Repayment of draws on the facility (i.e. assets acquired under a purchase agreement or loans made under a lending agreement) must not be subordinated to any interests of any note holder in the programme (e.g. ABCP programme) or subject to deferral or waiver.

579. Where these conditions are met, the bank may apply a 20% CCF to the amount of eligible liquidity facilities with an original maturity of one year or less, or a 50% CCF if the facility has an original maturity of more than one year. However, if an external rating of the facility itself is used for risk-weighting the facility, a 100% CCF must be applied.

Eligible liquidity facilities available only in the event of market disruption

580. Banks may apply a 0% CCF to eligible liquidity facilities that are only available in the event of a general market disruption (i.e. whereupon more than one SPE across different transactions are unable to roll over maturing commercial paper, and that inability is not the result of an impairment in the SPEs' credit quality or in the credit quality of the underlying exposures). To qualify for this treatment, the conditions provided in paragraph 578 must be satisfied. Additionally, the funds advanced by the bank to pay holders of the capital market instruments (e.g. commercial paper) when there is a general market disruption must be secured by the underlying assets, and must rank at least *pari passu* with the claims of holders of the capital market instruments.

Treatment of overlapping exposures

581. A bank may provide several types of facilities that can be drawn under various conditions. The same bank may be providing two or more of these facilities. Given the different triggers found in these facilities, it may be the case that a bank provides duplicative coverage to the underlying exposures. In other words, the facilities provided by a bank may overlap since a draw on one facility may preclude (in part) a draw under the other facility. In the case of overlapping facilities provided by the same bank, the bank does not need to hold additional capital for the overlap. Rather, it is only required to hold capital once for the position covered by the overlapping facilities (whether they are liquidity facilities or credit enhancements). Where the overlapping facilities are subject to different conversion factors, the bank must attribute the overlapping part to the facility with the highest conversion factor. However, if overlapping facilities are provided by different banks, each bank must hold capital for the maximum amount of the facility.

Eligible servicer cash advance facilities

582. Subject to national discretion, if contractually provided for, servicers may advance cash to ensure an uninterrupted flow of payments to investors so long as the servicer is entitled to full reimbursement and this right is senior to other claims on cash flows from the underlying pool of exposures. At national discretion, such undrawn servicer cash advances or facilities that are unconditionally cancellable without prior notice may be eligible for a 0% CCF.

(v) *Treatment of credit risk mitigation for securitisation exposures*

583. The treatment below applies to a bank that has obtained a credit risk mitigant on a securitisation exposure. Credit risk mitigants include guarantees, credit derivatives, collateral and on-balance sheet netting. Collateral in this context refers to that used to hedge the credit risk of a securitisation exposure rather than the underlying exposures of the securitisation transaction.

584. When a bank other than the originator provides credit protection to a securitisation exposure, it must calculate a capital requirement on the covered exposure as if it were an investor in that securitisation. If a bank provides protection to an unrated credit enhancement, it must treat the credit protection provided as if it were directly holding the unrated credit enhancement.

Collateral

585. Eligible collateral is limited to that recognised under the standardised approach for CRM (paragraphs 145 and 146). Collateral pledged by SPEs may be recognised.

Guarantees and credit derivatives

586. Credit protection provided by the entities listed in paragraph 195 may be recognised. SPEs cannot be recognised as eligible guarantors.

587. Where guarantees or credit derivatives fulfil the minimum operational conditions as specified in paragraphs 189 to 194, banks can take account of such credit protection in calculating capital requirements for securitisation exposures.

588. Capital requirements for the guaranteed/protected portion will be calculated according to CRM for the standardised approach as specified in paragraphs 196 to 201.

Maturity mismatches

589. For the purpose of setting regulatory capital against a maturity mismatch, the capital requirement will be determined in accordance with paragraphs 202 to 205. When the exposures being hedged have different maturities, the longest maturity must be used.

(vi) Capital requirement for early amortisation provisions

Scope

590. As described below, an originating bank is required to hold capital against all or a portion of the investors' interest (i.e. against both the drawn and undrawn balances related to the securitised exposures) when:

- (a) It sells exposures into a structure that contains an early amortisation feature; and
- (b) The exposures sold are of a revolving nature. These involve exposures where the borrower is permitted to vary the drawn amount and repayments within an agreed limit under a line of credit (e.g. credit card receivables and corporate loan commitments).

591. The capital requirement should reflect the type of mechanism through which an early amortisation is triggered.

592. For securitisation structures wherein the underlying pool comprises revolving and term exposures, a bank must apply the relevant early amortisation treatment (outlined below in paragraphs 594 to 605) to that portion of the underlying pool containing revolving exposures.

593. Banks are not required to calculate a capital requirement for early amortisations in the following situations:

- (a) Replenishment structures where the underlying exposures do not revolve and the early amortisation ends the ability of the bank to add new exposures;

- (b) Transactions of revolving assets containing early amortisation features that mimic term structures (i.e. where the risk on the underlying facilities does not return to the originating bank);
- (c) Structures where a bank securitises one or more credit line(s) and where investors remain fully exposed to future draws by borrowers even after an early amortisation event has occurred;
- (d) The early amortisation clause is solely triggered by events not related to the performance of the securitised assets or the selling bank, such as material changes in tax laws or regulations.

Maximum capital requirement

594. For a bank subject to the early amortisation treatment, the total capital charge for all of its positions will be subject to a maximum capital requirement (i.e. a 'cap') equal to the greater of (i) that required for retained securitisation exposures, or (ii) the capital requirement that would apply had the exposures not been securitised. In addition, banks must deduct the entire amount of any gain-on-sale and credit enhancing I/Os arising from the securitisation transaction in accordance with paragraphs 561 to 563.

Mechanics

595. The originator's capital charge for the investors' interest is determined as the product of (a) the investors' interest, (b) the appropriate CCF (as discussed below), and (c) the risk weight appropriate to the underlying exposure type, as if the exposures had not been securitised. As described below, the CCFs depend upon whether the early amortisation repays investors through a controlled or non-controlled mechanism. They also differ according to whether the securitised exposures are uncommitted retail credit lines (e.g. credit card receivables) or other credit lines (e.g. revolving corporate facilities). A line is considered uncommitted if it is unconditionally cancellable without prior notice.

(vii) Determination of CCFs for controlled early amortisation features

596. An early amortisation feature is considered controlled when the definition as specified in paragraph 548 is satisfied.

Uncommitted retail exposures

597. For uncommitted retail credit lines (e.g. credit card receivables) in securitisations containing controlled early amortisation features, banks must compare the three-month average excess spread defined in paragraph 550 to the point at which the bank is required to trap excess spread as economically required by the structure (i.e. excess spread trapping point).

598. In cases where such a transaction does not require excess spread to be trapped, the trapping point is deemed to be 4.5 percentage points.

599. The bank must divide the excess spread level by the transaction's excess spread trapping point to determine the appropriate segments and apply the corresponding conversion factors, as outlined in the following table.

Controlled early amortisation features

	Uncommitted	Committed
Retail credit lines	<p style="text-align: center;">3-month average excess spread Credit Conversion Factor (CCF)</p> <p>133.33% of trapping point or more 0% CCF</p> <p>less than 133.33% to 100% of trapping point 1% CCF</p> <p>less than 100% to 75% of trapping point 2% CCF</p> <p>less than 75% to 50% of trapping point 10% CCF</p> <p>less than 50% to 25% of trapping point 20% CCF</p> <p>less than 25% 40% CCF</p>	90% CCF
Non-retail credit lines	90% CCF	90% CCF

600. Banks are required to apply the conversion factors set out above for controlled mechanisms to the investors' interest referred to in paragraph 595.

Other exposures

601. All other securitised revolving exposures (i.e. those that are committed and all non-retail exposures) with controlled early amortisation features will be subject to a CCF of 90% against the off-balance sheet exposures.

(viii) Determination of CCFs for non-controlled early amortisation features

602. Early amortisation features that do not satisfy the definition of a controlled early amortisation as specified in paragraph 548 will be considered non-controlled and treated as follows.

Uncommitted retail exposures

603. For uncommitted retail credit lines (e.g. credit card receivables) in securitisations containing non-controlled early amortisation features, banks must make the comparison described in paragraphs 597 and 598:

604. The bank must divide the excess spread level by the transaction's excess spread trapping point to determine the appropriate segments and apply the corresponding conversion factors, as outlined in the following table.

Non-controlled early amortisation features

	Uncommitted	Committed
Retail credit lines	<p style="text-align: center;">3-month average excess spread Credit Conversion Factor (CCF)</p> <p>133.33% or more of trapping point 0% CCF</p> <p>less than 133.33% to 100% of trapping point 5% CCF</p> <p>less than 100% to 75% of trapping point 15% CCF</p> <p>less than 75% to 50% of trapping point 50% CCF</p> <p>less than 50% of trapping point 100% CCF</p>	100% CCF
Non-retail credit lines	100% CCF	100% CCF

Other exposures

605. All other securitised revolving exposures (i.e. those that are committed and all non-retail exposures) with non-controlled early amortisation features will be subject to a CCF of 100% against the off-balance sheet exposures.

4. Internal ratings-based approach for securitisation exposures

(i) Scope

606. Banks that have received approval to use the IRB approach for the type of underlying exposures securitised (e.g. for their corporate or retail portfolio) must use the IRB approach for securitisations. Conversely, banks may not use the IRB approach to securitisation unless they receive approval to use the IRB approach for the underlying exposures from their national supervisors.

607. If the bank is using the IRB approach for some exposures and the standardised approach for other exposures in the underlying pool, it should generally use the approach corresponding to the predominant share of exposures within the pool. The bank should consult with its national supervisors on which approach to apply to its securitisation exposures. To ensure appropriate capital levels, there may be instances where the supervisor requires a treatment other than this general rule.

608. Where there is no specific IRB treatment for the underlying asset type, originating banks that have received approval to use the IRB approach must calculate capital charges on their securitisation exposures using the standardised approach in the securitisation framework, and investing banks with approval to use the IRB approach must apply the RBA.

(ii) *Hierarchy of approaches*

609. The Ratings-Based Approach (RBA) must be applied to securitisation exposures that are rated, or where a rating can be inferred as described in paragraph 617. Where an external or an inferred rating is not available, either the Supervisory Formula (SF) or the Internal Assessment Approach (IAA) must be applied. The IAA is only available to exposures (e.g. liquidity facilities and credit enhancements) that banks (including third-party banks) extend to ABCP programmes. Such exposures must satisfy the conditions of paragraphs 619 and 620. For liquidity facilities to which none of these approaches can be applied, banks may apply the treatment specified in paragraph 639. Exceptional treatment for eligible servicer cash advance facilities is specified in paragraph 641. Securitisation exposures to which none of these approaches can be applied must be deducted.

(iii) *Maximum capital requirement*

610. For a bank using the IRB approach to securitisation, the maximum capital requirement for the securitisation exposures it holds is equal to the IRB capital requirement that would have been assessed against the underlying exposures had they not been securitised and treated under the appropriate sections of the IRB framework including Section III.G. In addition, banks must deduct the entire amount of any gain-on-sale and credit enhancing I/Os arising from the securitisation transaction in accordance with paragraphs 561 to 563.

(iv) *Ratings-Based Approach (RBA)*

611. Under the RBA, the risk-weighted assets are determined by multiplying the amount of the exposure by the appropriate risk weights, provided in the tables below.

612. The risk weights depend on (i) the external rating grade or an available inferred rating, (ii) whether the credit rating (external or inferred) represents a long-term or a short-term credit rating, (iii) the granularity of the underlying pool and (iv) the seniority of the position.

613. For purposes of the RBA, a securitisation exposure is treated as a senior tranche if it is effectively backed or secured by a first claim on the entire amount of the assets in the underlying securitised pool. While this generally includes only the most senior position within a securitisation transaction, in some instances there may be some other claim that, in a technical sense, may be more senior in the waterfall (e.g. a swap claim) but may be disregarded for the purpose of determining which positions are subject to the “senior tranches” column.

Examples:

- (a) In a typical synthetic securitisation, the “super-senior” tranche would be treated as a senior tranche, provided that all of the conditions for inferring a rating from a lower tranche are fulfilled.
- (b) In a traditional securitisation where all tranches above the first-loss piece are rated, the most highly rated position would be treated as a senior tranche. However, when there are several tranches that share the same rating, only the most senior one in the waterfall would be treated as senior.
- (c) Usually a liquidity facility supporting an ABCP programme would not be the most senior position within the programme; the commercial paper, which benefits from the liquidity support, typically would be the most senior position. However, if the liquidity facility is sized to cover all of the outstanding commercial paper, it can be viewed as

covering all losses on the underlying receivables pool that exceed the amount of over-collateralisation/reserves provided by the seller and as being most senior. As a result, the RBA risk weights in the left-most column can be used for such positions. On the other hand, if a liquidity or credit enhancement facility constituted a mezzanine position in economic substance rather than a senior position in the underlying pool, then the “Base risk weights” column is applicable.

614. The risk weights provided in the first table below apply when the external assessment represents a long-term credit rating, as well as when an inferred rating based on a long-term rating is available.

615. Banks may apply the risk weights for senior positions if the effective number of underlying exposures (N, as defined in paragraph 633) is 6 or more and the position is senior as defined above. When N is less than 6, the risk weights in column 4 of the first table below apply. In all other cases, the risk weights in column 3 of the first table below apply.

RBA risk weights when the external assessment represents a long-term credit rating and/or an inferred rating derived from a long-term assessment

External Rating (Illustrative)	Risk weights for senior positions and eligible senior IAA exposures	Base risk weights	Risk weights for tranches backed by non-granular pools
AAA	7%	12%	20%
AA	8%	15%	25%
A+	10%	18%	35%
A	12%	20%	
A-	20%	35%	
BBB+	35%		50%
BBB	60%		75%
BBB-		100%	
BB+		250%	
BB		425%	
BB-		650%	
Below BB- and unrated		Deduction	

616. The risk weights in the table below apply when the external assessment represents a short-term credit rating, as well as when an inferred rating based on a short-term rating is available. The decision rules outlined in paragraph 615 also apply for short-term credit ratings.

RBA risk weights when the external assessment represents a short-term credit rating and/or an inferred rating derived from a short-term assessment

External Rating (Illustrative)	Risk weights for senior positions and eligible senior IAA exposures	Base risk weights	Risk weights for tranches backed by non-granular pools
A-1/P-1	7%	12%	20%
A-2/P-2	12%	20%	35%
A-3/P-3	60%	75%	75%
All other ratings/unrated	Deduction	Deduction	Deduction

Use of inferred ratings

617. When the following minimum operational requirements are satisfied a bank must attribute an inferred rating to an unrated position. These requirements are intended to ensure that the unrated position is senior in all respects to an externally rated securitisation exposure termed the 'reference securitisation exposure'.

Operational requirements for inferred ratings

618. The following operational requirements must be satisfied to recognise inferred ratings.

- (a) The reference securitisation exposure (e.g. ABS) must be subordinate in all respects to the unrated securitisation exposure. Credit enhancements, if any, must be taken into account when assessing the relative subordination of the unrated exposure and the reference securitisation exposure. For example, if the reference securitisation exposure benefits from any third-party guarantees or other credit enhancements that are not available to the unrated exposure, then the latter may not be assigned an inferred rating based on the reference securitisation exposure.
- (b) The maturity of the reference securitisation exposure must be equal to or longer than that of the unrated exposure.
- (c) On an ongoing basis, any inferred rating must be updated continuously to reflect any changes in the external rating of the reference securitisation exposure.
- (d) The external rating of the reference securitisation exposure must satisfy the general requirements for recognition of external ratings as delineated in paragraph 565.
- (v) *Internal Assessment Approach (IAA)*

619. A bank may use its internal assessments of the credit quality of the securitisation exposures the bank extends to ABCP programmes (e.g. liquidity facilities and credit enhancements) if the bank's internal assessment process meets the operational requirements below. Internal assessments of exposures provided to ABCP programmes must be mapped to equivalent external ratings of an ECAI. Those rating equivalents are used to determine the appropriate risk weights under the RBA for purposes of assigning the notional amounts of the exposures.

620. A bank's internal assessment process must meet the following operational requirements in order to use internal assessments in determining the IRB capital requirement

arising from liquidity facilities, credit enhancements, or other exposures extended to an ABCP programme.

- (a) For the unrated exposure to qualify for the IAA, the ABCP must be externally rated. The ABCP itself is subject to the RBA.
- (b) The internal assessment of the credit quality of a securitisation exposure to the ABCP programme must be based on an ECAI criteria for the asset type purchased and must be the equivalent of at least investment grade when initially assigned to an exposure. In addition, the internal assessment must be used in the bank's internal risk management processes, including management information and economic capital systems, and generally must meet all the relevant requirements of the IRB framework.
- (c) In order for banks to use the IAA, their supervisors must be satisfied (i) that the ECAI meets the ECAI eligibility criteria outlined in paragraphs 90 to 108 and (ii) with the ECAI rating methodologies used in the process. In addition, banks have the responsibility to demonstrate to the satisfaction of their supervisors how these internal assessments correspond with the relevant ECAI's standards.

For instance, when calculating the credit enhancement level in the context of the IAA, supervisors may, if warranted, disallow on a full or partial basis any seller-provided recourse guarantees or excess spread, or any other first loss credit enhancements that provide limited protection to the bank.

- (d) The bank's internal assessment process must identify gradations of risk. Internal assessments must correspond to the external ratings of ECAs so that supervisors can determine which internal assessment corresponds to each external rating category of the ECAs.
- (e) The bank's internal assessment process, particularly the stress factors for determining credit enhancement requirements, must be at least as conservative as the publicly available rating criteria of the major ECAs that are externally rating the ABCP programme's commercial paper for the asset type being purchased by the programme. However, banks should consider, to some extent, all publicly available ECAI ratings methodologies in developing their internal assessments.
- In the case where (i) the commercial paper issued by an ABCP programme is externally rated by two or more ECAs and (ii) the different ECAs' benchmark stress factors require different levels of credit enhancement to achieve the same external rating equivalent, the bank must apply the ECAI stress factor that requires the most conservative or highest level of credit protection. For example, if one ECAI required enhancement of 2.5 to 3.5 times historical losses for an asset type to obtain a single A rating equivalent and another required 2 to 3 times historical losses, the bank must use the higher range of stress factors in determining the appropriate level of seller-provided credit enhancement.
- When selecting ECAs to externally rate an ABCP, a bank must not choose only those ECAs that generally have relatively less restrictive rating methodologies. In addition, if there are changes in the methodology of one of the selected ECAs, including the stress factors, that adversely affect the external rating of the programme's commercial paper, then the revised rating methodology must be considered in evaluating whether the internal assessments assigned to ABCP programme exposures are in need of revision.

- A bank cannot utilise an ECAI's rating methodology to derive an internal assessment if the ECAI's process or rating criteria is not publicly available. However, banks should consider the non-publicly available methodology — to the extent that they have access to such information — in developing their internal assessments, particularly if it is more conservative than the publicly available criteria.
 - In general, if the ECAI rating methodologies for an asset or exposure are not publicly available, then the IAA may not be used. However, in certain instances, for example, for new or uniquely structured transactions, which are not currently addressed by the rating criteria of an ECAI rating the programme's commercial paper, a bank may discuss the specific transaction with its supervisor to determine whether the IAA may be applied to the related exposures.
- (f) Internal or external auditors, an ECAI, or the bank's internal credit review or risk management function must perform regular reviews of the internal assessment process and assess the validity of those internal assessments. If the bank's internal audit, credit review, or risk management functions perform the reviews of the internal assessment process, then these functions must be independent of the ABCP programme business line, as well as the underlying customer relationships.
- (g) The bank must track the performance of its internal assessments over time to evaluate the performance of the assigned internal assessments and make adjustments, as necessary, to its assessment process when the performance of the exposures routinely diverges from the assigned internal assessments on those exposures.
- (h) The ABCP programme must have credit and investment guidelines, i.e. underwriting standards, for the ABCP programme. In the consideration of an asset purchase, the ABCP programme (i.e. the programme administrator) should develop an outline of the structure of the purchase transaction. Factors that should be discussed include the type of asset being purchased; type and monetary value of the exposures arising from the provision of liquidity facilities and credit enhancements; loss waterfall; and legal and economic isolation of the transferred assets from the entity selling the assets.
- (i) A credit analysis of the asset seller's risk profile must be performed and should consider, for example, past and expected future financial performance; current market position; expected future competitiveness; leverage, cash flow, and interest coverage; and debt rating. In addition, a review of the seller's underwriting standards, servicing capabilities, and collection processes should be performed.
- (j) The ABCP programme's underwriting policy must establish minimum asset eligibility criteria that, among other things,
- exclude the purchase of assets that are significantly past due or defaulted;
 - limit excess concentration to individual obligor or geographic area; and
 - limit the tenor of the assets to be purchased.
- (k) The ABCP programme should have collections processes established that consider the operational capability and credit quality of the servicer. The programme should mitigate to the extent possible seller/servicer risk through various methods, such as triggers based on current credit quality that would preclude co-mingling of funds and

impose lockbox arrangements that would help ensure the continuity of payments to the ABCP programme.

- (l) The aggregate estimate of loss on an asset pool that the ABCP programme is considering purchasing must consider all sources of potential risk, such as credit and dilution risk. If the seller-provided credit enhancement is sized based on only credit-related losses, then a separate reserve should be established for dilution risk, if dilution risk is material for the particular exposure pool. In addition, in sizing the required enhancement level, the bank should review several years of historical information, including losses, delinquencies, dilutions, and the turnover rate of the receivables. Furthermore, the bank should evaluate the characteristics of the underlying asset pool, e.g. weighted average credit score, identify any concentrations to an individual obligor or geographic region, and the granularity of the asset pool.
- (m) The ABCP programme must incorporate structural features into the purchase of assets in order to mitigate potential credit deterioration of the underlying portfolio. Such features may include wind down triggers specific to a pool of exposures.

621. The notional amount of the securitisation exposure to the ABCP programme must be assigned to the risk weight in the RBA appropriate to the credit rating equivalent assigned to the bank's exposure.

622. If a bank's internal assessment process is no longer considered adequate, the bank's supervisor may preclude the bank from applying the internal assessment approach to its ABCP exposures, both existing and newly originated, for determining the appropriate capital treatment until the bank has remedied the deficiencies. In this instance, the bank must revert to the SF or, if not available, to the method described in paragraph 639.

(vi) *Supervisory Formula (SF)*

623. As in the IRB approaches, risk-weighted assets generated through the use of the SF are calculated by multiplying the capital charge by 12.5. Under the SF, the capital charge for a securitisation tranche depends on five bank-supplied inputs: the IRB capital charge had the underlying exposures not been securitised (K_{IRB}); the tranche's credit enhancement level (L) and thickness (T); the pool's effective number of exposures (N); and the pool's exposure-weighted average loss-given-default (LGD). The inputs K_{IRB} , L , T and N are defined below. The capital charge is calculated as follows:

- (1) *Tranche's IRB capital charge* = the amount of exposures that have been securitised times the greater of (a) $0.0056 \times T$, or (b) $(S[L+T] - S[L])$,

where the function $S[.]$ (termed the 'Supervisory Formula') is defined in the following paragraph. When the bank holds only a proportional interest in the tranche, that position's capital charge equals the prorated share of the capital charge for the entire tranche.

624. The Supervisory Formula is given by the following expression:

$$(2) \quad S[L] = \begin{cases} L & \text{when } L \leq K_{IRB} \\ K_{IRB} + K[L] - K[K_{IRB}] + (d \cdot K_{IRB} / \omega) \left(1 - e^{\omega(K_{IRB} - L) / K_{IRB}} \right) & \text{when } K_{IRB} < L \end{cases}$$

where

$$\begin{aligned}
h &= (1 - K_{IRB}/LGD)^N \\
c &= K_{IRB}/(1 - h) \\
v &= \frac{(LGD - K_{IRB})K_{IRB} + 0.25(1 - LGD)K_{IRB}}{N} \\
f &= \left(\frac{v + K_{IRB}^2}{1 - h} - c^2 \right) + \frac{(1 - K_{IRB})K_{IRB} - v}{(1 - h)\tau} \\
g &= \frac{(1 - c)c}{f} - 1 \\
a &= g \cdot c \\
b &= g \cdot (1 - c) \\
d &= 1 - (1 - h) \cdot (1 - \text{Beta}[K_{IRB}; a, b]) \\
K[L] &= (1 - h) \cdot ((1 - \text{Beta}[L; a, b])L + \text{Beta}[L; a + 1, b]c).
\end{aligned}$$

625. In these expressions, Beta[L; a, b] refers to the cumulative beta distribution with parameters a and b evaluated at L.⁹⁶

626. The supervisory-determined parameters in the above expressions are as follows:

$$\tau = 1000, \text{ and } \omega = 20$$

Definition of K_{IRB}

627. K_{IRB} is the ratio of (a) the IRB capital requirement including the EL portion for the underlying exposures in the pool to (b) the exposure amount of the pool (e.g. the sum of drawn amounts related to securitised exposures plus the EAD associated with undrawn commitments related to securitised exposures). Quantity (a) above must be calculated in accordance with the applicable minimum IRB standards (as set out in Section III of this document) as if the exposures in the pool were held directly by the bank. This calculation should reflect the effects of any credit risk mitigant that is applied on the underlying exposures (either individually or to the entire pool), and hence benefits all of the securitisation exposures. K_{IRB} is expressed in decimal form (e.g. a capital charge equal to 15% of the pool would be expressed as 0.15). For structures involving an SPE, all the assets of the SPE that are related to the securitisations are to be treated as exposures in the pool, including assets in which the SPE may have invested a reserve account, such as a cash collateral account.

628. If the risk weight resulting from the SF is 1250%, banks must deduct the securitisation exposure subject to that risk weight in accordance with paragraphs 561 to 563.

629. In cases where a bank has set aside a specific provision or has a non-refundable purchase price discount on an exposure in the pool, quantity (a) defined above and quantity (b) also defined above must be calculated using the gross amount of the exposure without the specific provision and/or non-refundable purchase price discount. In this case, the amount of the non-refundable purchase price discount on a defaulted asset or the specific

⁹⁶ The cumulative beta distribution function is available, for example, in Excel as the function BETADIST.

provision can be used to reduce the amount of any deduction from capital associated with the securitisation exposure.

Credit enhancement level (L)

630. L is measured (in decimal form) as the ratio of (a) the amount of all securitisation exposures subordinate to the tranche in question to (b) the amount of exposures in the pool. Banks will be required to determine L before considering the effects of any tranche-specific credit enhancements, such as third-party guarantees that benefit only a single tranche. Any gain-on-sale and/or credit enhancing I/Os associated with the securitisation are not to be included in the measurement of L. The size of interest rate or currency swaps that are more junior than the tranche in question may be measured at their current values (without the potential future exposures) in calculating the enhancement level. If the current value of the instrument cannot be measured, the instrument should be ignored in the calculation of L.

631. If there is any reserve account funded by accumulated cash flows from the underlying exposures that is more junior than the tranche in question, this can be included in the calculation of L. Unfunded reserve accounts may not be included if they are to be funded from future receipts from the underlying exposures.

Thickness of exposure (T)

632. T is measured as the ratio of (a) the nominal size of the tranche of interest to (b) the notional amount of exposures in the pool. In the case of an exposure arising from an interest rate or currency swap, the bank must incorporate potential future exposure. If the current value of the instrument is non-negative, the exposure size should be measured by the current value plus the add-on as in Section VII of Annex 4. If the current value is negative, the exposure should be measured by using the potential future exposure only.

Effective number of exposures (N)

633. The effective number of exposures is calculated as:

$$(3) \quad N = \frac{\left(\sum_i EAD_i \right)^2}{\sum_i EAD_i^2}$$

where EAD_i represents the exposure-at-default associated with the i^{th} instrument in the pool. Multiple exposures to the same obligor must be consolidated (i.e. treated as a single instrument). In the case of re-securitisation (securitisation of securitisation exposures), the formula applies to the number of securitisation exposures in the pool and not the number of underlying exposures in the original pools. If the portfolio share associated with the largest exposure, C_1 , is available, the bank may compute N as $1/C_1$.

Exposure-weighted average LGD

634. The exposure-weighted average LGD is calculated as follows:

$$(4) \quad LGD = \frac{\sum_i LGD_i \cdot EAD_i}{\sum_i EAD_i}$$

where LGD_i represents the average LGD associated with all exposures to the i^{th} obligor. In the case of re-securitisation, an LGD of 100% must be assumed for the underlying

securitised exposures. When default and dilution risks for purchased receivables are treated in an aggregate manner (e.g. a single reserve or over-collateralisation is available to cover losses from either source) within a securitisation, the LGD input must be constructed as a weighted-average of the LGD for default risk and the 100% LGD for dilution risk. The weights are the stand-alone IRB capital charges for default risk and dilution risk, respectively.

Simplified method for computing N and LGD

635. For securitisations involving retail exposures, subject to supervisory review, the SF may be implemented using the simplifications: $h = 0$ and $v = 0$.

636. Under the conditions provided below, banks may employ a simplified method for calculating the effective number of exposures and the exposure-weighted average LGD. Let C_m in the simplified calculation denote the share of the pool corresponding to the sum of the largest 'm' exposures (e.g. a 15% share corresponds to a value of 0.15). The level of m is set by each bank.

- If the portfolio share associated with the largest exposure, C_1 , is no more than 0.03 (or 3% of the underlying pool), then for purposes of the SF, the bank may set $LGD=0.50$ and N equal to the following amount

$$(5) \quad N = \left(C_1 C_m + \left(\frac{C_m - C_1}{m - 1} \right) \max\{1 - m C_1, 0\} \right)^{-1}$$

- Alternatively, if only C_1 is available and this amount is no more than 0.03, then the bank may set $LGD=0.50$ and $N=1/ C_1$.

(vii) Liquidity facilities

637. Liquidity facilities are treated as any other securitisation exposure and receive a CCF of 100% unless specified differently in paragraphs 638 to 641. If the facility is externally rated, the bank may rely on the external rating under the RBA. If the facility is not rated and an inferred rating is not available, the bank must apply the SF, unless the IAA can be applied.

638. An eligible liquidity facility that can only be drawn in the event of a general market disruption as defined in paragraph 580 is assigned a 20% CCF under the SF. That is, an IRB bank is to recognise 20% of the capital charge generated under the SF for the facility. If the eligible facility is externally rated, the bank may rely on the external rating under the RBA provided it assigns a 100% CCF rather than a 20% CCF to the facility.

639. When it is not practical for the bank to use either the bottom-up approach or the top-down approach for calculating K_{IRB} , the bank may, on an exceptional basis and subject to supervisory consent, temporarily be allowed to apply the following method. If the liquidity facility meets the definition in paragraph 578 or 580, the highest risk weight assigned under the standardised approach to any of the underlying individual exposures covered by the liquidity facility can be applied to the liquidity facility. If the liquidity facility meets the definition in paragraph 578, the CCF must be 50% for a facility with an original maturity of one year or less, or 100% if the facility has an original maturity of more than one year. If the liquidity facility meets the definition in paragraph 580, the CCF must be 20%. In all other cases, the notional amount of the liquidity facility must deducted.

(viii) Treatment of overlapping exposures

640. Overlapping exposures are treated as described in paragraph 581.

(ix) *Eligible servicer cash advance facilities*

641. Eligible servicer cash advance facilities are treated as specified in paragraph 582.

(x) *Treatment of credit risk mitigation for securitisation exposures*

642. As with the RBA, banks are required to apply the CRM techniques as specified in the foundation IRB approach of Section III when applying the SF. The bank may reduce the capital charge proportionally when the credit risk mitigant covers first losses or losses on a proportional basis. For all other cases, the bank must assume that the credit risk mitigant covers the most senior portion of the securitisation exposure (i.e. that the most junior portion of the securitisation exposure is uncovered). Examples for recognising collateral and guarantees under the SF are provided in Annex 7.

(xi) *Capital requirement for early amortisation provisions*

643. An originating bank must use the methodology and treatment described in paragraphs 590 to 605 for determining if any capital must be held against the investors' interest. For banks using the IRB approach to securitisation, investors' interest is defined as investors' drawn balances related to securitisation exposures and EAD associated with investors' undrawn lines related to securitisation exposures. For determining the EAD, the undrawn balances of securitised exposures would be allocated between the seller's and investors' interests on a pro rata basis, based on the proportions of the seller's and investors' shares of the securitised drawn balances. For IRB purposes, the capital charge attributed to the investors' interest is determined by the product of (a) the investors' interest, (b) the appropriate CCF, and (c) K_{IRB} .

V. Operational Risk

A. Definition of operational risk

644. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk,⁹⁷ but excludes strategic and reputational risk.

B. The measurement methodologies

645. The framework outlined below presents three methods for calculating operational risk capital charges in a continuum of increasing sophistication and risk sensitivity: (i) the Basic Indicator Approach; (ii) the Standardised Approach; and (iii) Advanced Measurement Approaches (AMA).

646. Banks are encouraged to move along the spectrum of available approaches as they develop more sophisticated operational risk measurement systems and practices. Qualifying criteria for the Standardised Approach and AMA are presented below.

647. Internationally active banks and banks with significant operational risk exposures (for example, specialised processing banks) are expected to use an approach that is more sophisticated than the Basic Indicator Approach and that is appropriate for the risk profile of the institution.⁹⁸ A bank will be permitted to use the Basic Indicator or Standardised Approach for some parts of its operations and an AMA for others provided certain minimum criteria are met, see paragraphs 680 to 683.

648. A bank will not be allowed to choose to revert to a simpler approach once it has been approved for a more advanced approach without supervisory approval. However, if a supervisor determines that a bank using a more advanced approach no longer meets the qualifying criteria for this approach, it may require the bank to revert to a simpler approach for some or all of its operations, until it meets the conditions specified by the supervisor for returning to a more advanced approach.

1. The Basic Indicator Approach

649. Banks using the Basic Indicator Approach must hold capital for operational risk equal to the average over the previous three years of a fixed percentage (denoted alpha) of positive annual gross income. Figures for any year in which annual gross income is negative or zero should be excluded from both the numerator and denominator when calculating the average.⁹⁹ The charge may be expressed as follows:

$$K_{BIA} = \left[\sum (GI_{1..n} \times \alpha) \right] / n$$

⁹⁷ Legal risk includes, but is not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements.

⁹⁸ Supervisors will review the capital requirement produced by the operational risk approach used by a bank (whether Basic Indicator Approach, Standardised Approach or AMA) for general credibility, especially in relation to a firm's peers. In the event that credibility is lacking, appropriate supervisory action under Pillar 2 will be considered.

⁹⁹ If negative gross income distorts a bank's Pillar 1 capital charge, supervisors will consider appropriate supervisory action under Pillar 2.

where:

K_{BIA} = the capital charge under the Basic Indicator Approach

GI = annual gross income, where positive, over the previous three years

N = number of the previous three years for which gross income is positive

α = 15%, which is set by the Committee, relating the industry wide level of required capital to the industry wide level of the indicator.

650. Gross income is defined as net interest income plus net non-interest income.¹⁰⁰ It is intended that this measure should: (i) be gross of any provisions (e.g. for unpaid interest); (ii) be gross of operating expenses, including fees paid to outsourcing service providers;¹⁰¹ (iii) exclude realised profits/losses from the sale of securities in the banking book;¹⁰² and (iv) exclude extraordinary or irregular items as well as income derived from insurance.

651. As a point of entry for capital calculation, no specific criteria for use of the Basic Indicator Approach are set out in this Framework. Nevertheless, banks using this approach are encouraged to comply with the Committee's guidance on *Sound Practices for the Management and Supervision of Operational Risk*, February 2003.

¹⁰⁰ As defined by national supervisors and/or national accounting standards.

¹⁰¹ In contrast to fees paid for services that are outsourced, fees received by banks that provide outsourcing services shall be included in the definition of gross income.

¹⁰² Realised profits/losses from securities classified as "held to maturity" and "available for sale", which typically constitute items of the banking book (e.g. under certain accounting standards), are also excluded from the definition of gross income.

2. **The Standardised Approach**^{103,104}

652. In the Standardised Approach, banks' activities are divided into eight business lines: corporate finance, trading & sales, retail banking, commercial banking, payment & settlement, agency services, asset management, and retail brokerage. The business lines are defined in detail in Annex 8.

653. Within each business line, gross income is a broad indicator that serves as a proxy for the scale of business operations and thus the likely scale of operational risk exposure within each of these business lines. The capital charge for each business line is calculated by multiplying gross income by a factor (denoted beta) assigned to that business line. Beta serves as a proxy for the industry-wide relationship between the operational risk loss experience for a given business line and the aggregate level of gross income for that business line. It should be noted that in the Standardised Approach gross income is measured for each business line, not the whole institution, i.e. in corporate finance, the indicator is the gross income generated in the corporate finance business line.

¹⁰³ The Committee intends to reconsider the calibration of the Basic Indicator and Standardised Approaches when more risk-sensitive data are available to carry out this recalibration. Any such recalibration would not be intended to affect significantly the overall calibration of the operational risk component of the Pillar 1 capital charge.

¹⁰⁴ **The Alternative Standardised Approach**

At national supervisory discretion a supervisor can choose to allow a bank to use the Alternative Standardised Approach (ASA) provided the bank is able to satisfy its supervisor that this alternative approach provides an improved basis by, for example, avoiding double counting of risks. Once a bank has been allowed to use the ASA, it will not be allowed to revert to use of the Standardised Approach without the permission of its supervisor. It is not envisaged that large diversified banks in major markets would use the ASA.

Under the ASA, the operational risk capital charge/methodology is the same as for the Standardised Approach except for two business lines — retail banking and commercial banking. For these business lines, loans and advances — multiplied by a fixed factor 'm' — replaces gross income as the exposure indicator. The betas for retail and commercial banking are unchanged from the Standardised Approach. The ASA operational risk capital charge for retail banking (with the same basic formula for commercial banking) can be expressed as:

$$K_{RB} = \beta_{RB} \times m \times LA_{RB}$$

where

K_{RB} is the capital charge for the retail banking business line

β_{RB} is the beta for the retail banking business line

LA_{RB} is total outstanding retail loans and advances (non-risk weighted and gross of provisions), averaged over the past three years

m is 0.035

For the purposes of the ASA, total loans and advances in the retail banking business line consists of the total drawn amounts in the following credit portfolios: retail, SMEs treated as retail, and purchased retail receivables. For commercial banking, total loans and advances consists of the drawn amounts in the following credit portfolios: corporate, sovereign, bank, specialised lending, SMEs treated as corporate and purchased corporate receivables. The book value of securities held in the banking book should also be included.

Under the ASA, banks may aggregate retail and commercial banking (if they wish to) using a beta of 15%. Similarly, those banks that are unable to disaggregate their gross income into the other six business lines can aggregate the total gross income for these six business lines using a beta of 18%, with negative gross income treated as described in paragraph 654.

As under the Standardised Approach, the total capital charge for the ASA is calculated as the simple summation of the regulatory capital charges across each of the eight business lines.

654. The total capital charge is calculated as the three-year average of the simple summation of the regulatory capital charges across each of the business lines in each year. In any given year, negative capital charges (resulting from negative gross income) in any business line may offset positive capital charges in other business lines without limit.¹⁰⁵ However, where the aggregate capital charge across all business lines within a given year is negative, then the input to the numerator for that year will be zero.¹⁰⁶ The total capital charge may be expressed as:

$$K_{TSA} = \left\{ \sum_{\text{years } 1-3} \max \left[\sum (GI_{1-8} \times \beta_{1-8}), 0 \right] \right\} / 3$$

where:

K_{TSA} = the capital charge under the Standardised Approach

GI_{1-8} = annual gross income in a given year, as defined above in the Basic Indicator Approach, for each of the eight business lines

β_{1-8} = a fixed percentage, set by the Committee, relating the level of required capital to the level of the gross income for each of the eight business lines. The values of the betas are detailed below.

Business Lines	Beta Factors
Corporate finance (β_1)	18%
Trading and sales (β_2)	18%
Retail banking (β_3)	12%
Commercial banking (β_4)	15%
Payment and settlement (β_5)	18%
Agency services (β_6)	15%
Asset management (β_7)	12%
Retail brokerage (β_8)	12%

3. **Advanced Measurement Approaches (AMA)**

655. Under the AMA, the regulatory capital requirement will equal the risk measure generated by the bank's internal operational risk measurement system using the quantitative and qualitative criteria for the AMA discussed below. Use of the AMA is subject to supervisory approval.

656. A bank adopting the AMA may, with the approval of its host supervisors and the support of its home supervisor, use an allocation mechanism for the purpose of determining the regulatory capital requirement for internationally active banking subsidiaries that are not deemed to be significant relative to the overall banking group but are themselves subject to this Framework in accordance with Part 1. Supervisory approval would be conditional on the bank demonstrating to the satisfaction of the relevant supervisors that the allocation

¹⁰⁵ At national discretion, supervisors may adopt a more conservative treatment of negative gross income.

¹⁰⁶ As under the Basic Indicator Approach, if negative gross income distorts a bank's Pillar 1 capital charge under the Standardised Approach, supervisors will consider appropriate supervisory action under Pillar 2.

mechanism for these subsidiaries is appropriate and can be supported empirically. The board of directors and senior management of each subsidiary are responsible for conducting their own assessment of the subsidiary's operational risks and controls and ensuring the subsidiary is adequately capitalised in respect of those risks.

657. Subject to supervisory approval as discussed in paragraph 669(d), the incorporation of a well-reasoned estimate of diversification benefits may be factored in at the group-wide level or at the banking subsidiary level. However, any banking subsidiaries whose host supervisors determine that they must calculate stand-alone capital requirements (see Part 1) may not incorporate group-wide diversification benefits in their AMA calculations (e.g. where an internationally active banking subsidiary is deemed to be significant, the banking subsidiary may incorporate the diversification benefits of its own operations — those arising at the sub-consolidated level — but may not incorporate the diversification benefits of the parent).

658. The appropriateness of the allocation methodology will be reviewed with consideration given to the stage of development of risk-sensitive allocation techniques and the extent to which it reflects the level of operational risk in the legal entities and across the banking group. Supervisors expect that AMA banking groups will continue efforts to develop increasingly risk-sensitive operational risk allocation techniques, notwithstanding initial approval of techniques based on gross income or other proxies for operational risk.

659. Banks adopting the AMA will be required to calculate their capital requirement using this approach as well as the 1988 Accord as outlined in paragraph 46.

C. Qualifying criteria

1. *The Standardised Approach*¹⁰⁷

660. In order to qualify for use of the Standardised Approach, a bank must satisfy its supervisor that, at a minimum:

- Its board of directors and senior management, as appropriate, are actively involved in the oversight of the operational risk management framework;
- It has an operational risk management system that is conceptually sound and is implemented with integrity; and
- It has sufficient resources in the use of the approach in the major business lines as well as the control and audit areas.

661. Supervisors will have the right to insist on a period of initial monitoring of a bank's Standardised Approach before it is used for regulatory capital purposes.

662. A bank must develop specific policies and have documented criteria for mapping gross income for current business lines and activities into the standardised framework. The criteria must be reviewed and adjusted for new or changing business activities as appropriate. The principles for business line mapping are set out in Annex 8.

¹⁰⁷ Supervisors allowing banks to use the Alternative Standardised Approach must decide on the appropriate qualifying criteria for that approach, as the criteria set forth in paragraphs 662 and 663 of this section may not be appropriate.

663. As some internationally active banks will wish to use the Standardised Approach, it is important that such banks have adequate operational risk management systems. Consequently, an internationally active bank using the Standardised Approach must meet the following additional criteria:¹⁰⁸

- (a) The bank must have an operational risk management system with clear responsibilities assigned to an operational risk management function. The operational risk management function is responsible for developing strategies to identify, assess, monitor and control/mitigate operational risk; for codifying firm-level policies and procedures concerning operational risk management and controls; for the design and implementation of the firm's operational risk assessment methodology; and for the design and implementation of a risk-reporting system for operational risk.
- (b) As part of the bank's internal operational risk assessment system, the bank must systematically track relevant operational risk data including material losses by business line. Its operational risk assessment system must be closely integrated into the risk management processes of the bank. Its output must be an integral part of the process of monitoring and controlling the banks operational risk profile. For instance, this information must play a prominent role in risk reporting, management reporting, and risk analysis. The bank must have techniques for creating incentives to improve the management of operational risk throughout the firm.
- (c) There must be regular reporting of operational risk exposures, including material operational losses, to business unit management, senior management, and to the board of directors. The bank must have procedures for taking appropriate action according to the information within the management reports.
- (d) The bank's operational risk management system must be well documented. The bank must have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operational risk management system, which must include policies for the treatment of non-compliance issues.
- (e) The bank's operational risk management processes and assessment system must be subject to validation and regular independent review. These reviews must include both the activities of the business units and of the operational risk management function.
- (f) The bank's operational risk assessment system (including the internal validation processes) must be subject to regular review by external auditors and/or supervisors.

2. *Advanced Measurement Approaches (AMA)*

(i) General standards

664. In order to qualify for use of the AMA a bank must satisfy its supervisor that, at a minimum:

¹⁰⁸ For other banks, these criteria are recommended, with national discretion to impose them as requirements.

- Its board of directors and senior management, as appropriate, are actively involved in the oversight of the operational risk management framework;
- It has an operational risk management system that is conceptually sound and is implemented with integrity; and
- It has sufficient resources in the use of the approach in the major business lines as well as the control and audit areas.

665. A bank's AMA will be subject to a period of initial monitoring by its supervisor before it can be used for regulatory purposes. This period will allow the supervisor to determine whether the approach is credible and appropriate. As discussed below, a bank's internal measurement system must reasonably estimate unexpected losses based on the combined use of internal and relevant external loss data, scenario analysis and bank-specific business environment and internal control factors. The bank's measurement system must also be capable of supporting an allocation of economic capital for operational risk across business lines in a manner that creates incentives to improve business line operational risk management.

(ii) *Qualitative standards*

666. A bank must meet the following qualitative standards before it is permitted to use an AMA for operational risk capital:

- (a) The bank must have an independent operational risk management function that is responsible for the design and implementation of the bank's operational risk management framework. The operational risk management function is responsible for codifying firm-level policies and procedures concerning operational risk management and controls; for the design and implementation of the firm's operational risk measurement methodology; for the design and implementation of a risk-reporting system for operational risk; and for developing strategies to identify, measure, monitor and control/mitigate operational risk.
- (b) The bank's internal operational risk measurement system must be closely integrated into the day-to-day risk management processes of the bank. Its output must be an integral part of the process of monitoring and controlling the bank's operational risk profile. For instance, this information must play a prominent role in risk reporting, management reporting, internal capital allocation, and risk analysis. The bank must have techniques for allocating operational risk capital to major business lines and for creating incentives to improve the management of operational risk throughout the firm.
- (c) There must be regular reporting of operational risk exposures and loss experience to business unit management, senior management, and to the board of directors. The bank must have procedures for taking appropriate action according to the information within the management reports.
- (d) The bank's operational risk management system must be well documented. The bank must have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operational risk management system, which must include policies for the treatment of non-compliance issues.
- (e) Internal and/or external auditors must perform regular reviews of the operational risk management processes and measurement systems. This review must include both

the activities of the business units and of the independent operational risk management function.

- (f) The validation of the operational risk measurement system by external auditors and/or supervisory authorities must include the following:
- Verifying that the internal validation processes are operating in a satisfactory manner; and
 - Making sure that data flows and processes associated with the risk measurement system are transparent and accessible. In particular, it is necessary that auditors and supervisory authorities are in a position to have easy access, whenever they judge it necessary and under appropriate procedures, to the system's specifications and parameters.

(iii) *Quantitative standards*

AMA soundness standard

667. Given the continuing evolution of analytical approaches for operational risk, the Committee is not specifying the approach or distributional assumptions used to generate the operational risk measure for regulatory capital purposes. However, a bank must be able to demonstrate that its approach captures potentially severe 'tail' loss events. Whatever approach is used, a bank must demonstrate that its operational risk measure meets a soundness standard comparable to that of the internal ratings-based approach for credit risk, (i.e. comparable to a one year holding period and a 99.9th percentile confidence interval).

668. The Committee recognises that the AMA soundness standard provides significant flexibility to banks in the development of an operational risk measurement and management system. However, in the development of these systems, banks must have and maintain rigorous procedures for operational risk model development and independent model validation. Prior to implementation, the Committee will review evolving industry practices regarding credible and consistent estimates of potential operational losses. It will also review accumulated data, and the level of capital requirements estimated by the AMA, and may refine its proposals if appropriate.

Detailed criteria

669. This section describes a series of quantitative standards that will apply to internally-generated operational risk measures for purposes of calculating the regulatory minimum capital charge.

- (a) Any internal operational risk measurement system must be consistent with the scope of operational risk defined by the Committee in paragraph 644 and the loss event types defined in Annex 9.
- (b) Supervisors will require the bank to calculate its regulatory capital requirement as the sum of expected loss (EL) and unexpected loss (UL), unless the bank can demonstrate that it is adequately capturing EL in its internal business practices. That is, to base the minimum regulatory capital requirement on UL alone, the bank must be able to demonstrate to the satisfaction of its national supervisor that it has measured and accounted for its EL exposure.
- (c) A bank's risk measurement system must be sufficiently 'granular' to capture the major drivers of operational risk affecting the shape of the tail of the loss estimates.

- (d) Risk measures for different operational risk estimates must be added for purposes of calculating the regulatory minimum capital requirement. However, the bank may be permitted to use internally determined correlations in operational risk losses across individual operational risk estimates, provided it can demonstrate to the satisfaction of the national supervisor that its systems for determining correlations are sound, implemented with integrity, and take into account the uncertainty surrounding any such correlation estimates (particularly in periods of stress). The bank must validate its correlation assumptions using appropriate quantitative and qualitative techniques.
- (e) Any operational risk measurement system must have certain key features to meet the supervisory soundness standard set out in this section. These elements must include the use of internal data, relevant external data, scenario analysis and factors reflecting the business environment and internal control systems.
- (f) A bank needs to have a credible, transparent, well-documented and verifiable approach for weighting these fundamental elements in its overall operational risk measurement system. For example, there may be cases where estimates of the 99.9th percentile confidence interval based primarily on internal and external loss event data would be unreliable for business lines with a heavy-tailed loss distribution and a small number of observed losses. In such cases, scenario analysis, and business environment and control factors, may play a more dominant role in the risk measurement system. Conversely, operational loss event data may play a more dominant role in the risk measurement system for business lines where estimates of the 99.9th percentile confidence interval based primarily on such data are deemed reliable. In all cases, the bank's approach for weighting the four fundamental elements should be internally consistent and avoid the double counting of qualitative assessments or risk mitigants already recognised in other elements of the framework.

Internal data

670. Banks must track internal loss data according to the criteria set out in this section. The tracking of internal loss event data is an essential prerequisite to the development and functioning of a credible operational risk measurement system. Internal loss data is crucial for tying a bank's risk estimates to its actual loss experience. This can be achieved in a number of ways, including using internal loss data as the foundation of empirical risk estimates, as a means of validating the inputs and outputs of the bank's risk measurement system, or as the link between loss experience and risk management and control decisions.

671. Internal loss data is most relevant when it is clearly linked to a bank's current business activities, technological processes and risk management procedures. Therefore, a bank must have documented procedures for assessing the on-going relevance of historical loss data, including those situations in which judgement overrides, scaling, or other adjustments may be used, to what extent they may be used and who is authorised to make such decisions.

672. Internally generated operational risk measures used for regulatory capital purposes must be based on a minimum five-year observation period of internal loss data, whether the internal loss data is used directly to build the loss measure or to validate it. When the bank first moves to the AMA, a three-year historical data window is acceptable (this includes the parallel calculations in paragraph 46).

673. To qualify for regulatory capital purposes, a bank's internal loss collection processes must meet the following standards:

- To assist in supervisory validation, a bank must be able to map its historical internal loss data into the relevant level 1 supervisory categories defined in Annexes 8 and 9 and to provide these data to supervisors upon request. It must have documented, objective criteria for allocating losses to the specified business lines and event types. However, it is left to the bank to decide the extent to which it applies these categorisations in its internal operational risk measurement system.
- A bank's internal loss data must be comprehensive in that it captures all material activities and exposures from all appropriate sub-systems and geographic locations. A bank must be able to justify that any excluded activities or exposures, both individually and in combination, would not have a material impact on the overall risk estimates. A bank must have an appropriate *de minimis* gross loss threshold for internal loss data collection, for example €10,000. The appropriate threshold may vary somewhat between banks, and within a bank across business lines and/or event types. However, particular thresholds should be broadly consistent with those used by peer banks.
- Aside from information on gross loss amounts, a bank should collect information about the date of the event, any recoveries of gross loss amounts, as well as some descriptive information about the drivers or causes of the loss event. The level of detail of any descriptive information should be commensurate with the size of the gross loss amount.
- A bank must develop specific criteria for assigning loss data arising from an event in a centralised function (e.g. an information technology department) or an activity that spans more than one business line, as well as from related events over time.
- Operational risk losses that are related to credit risk and have historically been included in banks' credit risk databases (e.g. collateral management failures) will continue to be treated as credit risk for the purposes of calculating minimum regulatory capital under this Framework. Therefore, such losses will not be subject to the operational risk capital charge.¹⁰⁹ Nevertheless, for the purposes of internal operational risk management, banks must identify all material operational risk losses consistent with the scope of the definition of operational risk (as set out in paragraph 644 and the loss event types outlined in Annex 9), including those related to credit risk. Such material operational risk-related credit risk losses should be flagged separately within a bank's internal operational risk database. The materiality of these losses may vary between banks, and within a bank across business lines and/or event types. Materiality thresholds should be broadly consistent with those used by peer banks.
- Operational risk losses that are related to market risk are treated as operational risk for the purposes of calculating minimum regulatory capital under this Framework and will therefore be subject to the operational risk capital charge.

External data

674. A bank's operational risk measurement system must use relevant external data (either public data and/or pooled industry data), especially when there is reason to believe that the bank is exposed to infrequent, yet potentially severe, losses. These external data should include data on actual loss amounts, information on the scale of business operations where the event occurred, information on the causes and circumstances of the loss events,

¹⁰⁹ This applies to all banks, including those that may only now be designing their credit risk and operational risk databases.

or other information that would help in assessing the relevance of the loss event for other banks. A bank must have a systematic process for determining the situations for which external data must be used and the methodologies used to incorporate the data (e.g. scaling, qualitative adjustments, or informing the development of improved scenario analysis). The conditions and practices for external data use must be regularly reviewed, documented, and subject to periodic independent review.

Scenario analysis

675. A bank must use scenario analysis of expert opinion in conjunction with external data to evaluate its exposure to high-severity events. This approach draws on the knowledge of experienced business managers and risk management experts to derive reasoned assessments of plausible severe losses. For instance, these expert assessments could be expressed as parameters of an assumed statistical loss distribution. In addition, scenario analysis should be used to assess the impact of deviations from the correlation assumptions embedded in the bank's operational risk measurement framework, in particular, to evaluate potential losses arising from multiple simultaneous operational risk loss events. Over time, such assessments need to be validated and re-assessed through comparison to actual loss experience to ensure their reasonableness.

Business environment and internal control factors

676. In addition to using loss data, whether actual or scenario-based, a bank's firm-wide risk assessment methodology must capture key business environment and internal control factors that can change its operational risk profile. These factors will make a bank's risk assessments more forward-looking, more directly reflect the quality of the bank's control and operating environments, help align capital assessments with risk management objectives, and recognise both improvements and deterioration in operational risk profiles in a more immediate fashion. To qualify for regulatory capital purposes, the use of these factors in a bank's risk measurement framework must meet the following standards:

- The choice of each factor needs to be justified as a meaningful driver of risk, based on experience and involving the expert judgment of the affected business areas. Whenever possible, the factors should be translatable into quantitative measures that lend themselves to verification.
- The sensitivity of a bank's risk estimates to changes in the factors and the relative weighting of the various factors need to be well reasoned. In addition to capturing changes in risk due to improvements in risk controls, the framework must also capture potential increases in risk due to greater complexity of activities or increased business volume.
- The framework and each instance of its application, including the supporting rationale for any adjustments to empirical estimates, must be documented and subject to independent review within the bank and by supervisors.
- Over time, the process and the outcomes need to be validated through comparison to actual internal loss experience, relevant external data, and appropriate adjustments made.

(iv) *Risk mitigation*¹¹⁰

677. Under the AMA, a bank will be allowed to recognise the risk mitigating impact of insurance in the measures of operational risk used for regulatory minimum capital requirements. The recognition of insurance mitigation will be limited to 20% of the total operational risk capital charge calculated under the AMA.

678. A bank's ability to take advantage of such risk mitigation will depend on compliance with the following criteria:

- The insurance provider has a minimum claims paying ability rating of A (or equivalent).
- The insurance policy must have an initial term of no less than one year. For policies with a residual term of less than one year, the bank must make appropriate haircuts reflecting the declining residual term of the policy, up to a full 100% haircut for policies with a residual term of 90 days or less.
- The insurance policy has a minimum notice period for cancellation of 90 days.
- The insurance policy has no exclusions or limitations triggered by supervisory actions or, in the case of a failed bank, that preclude the bank, receiver or liquidator from recovering for damages suffered or expenses incurred by the bank, except in respect of events occurring after the initiation of receivership or liquidation proceedings in respect of the bank, provided that the insurance policy may exclude any fine, penalty, or punitive damages resulting from supervisory actions.
- The risk mitigation calculations must reflect the bank's insurance coverage in a manner that is transparent in its relationship to, and consistent with, the actual likelihood and impact of loss used in the bank's overall determination of its operational risk capital.
- The insurance is provided by a third-party entity. In the case of insurance through captives and affiliates, the exposure has to be laid off to an independent third-party entity, for example through re-insurance, that meets the eligibility criteria.
- The framework for recognising insurance is well reasoned and documented.
- The bank discloses a description of its use of insurance for the purpose of mitigating operational risk.

679. A bank's methodology for recognising insurance under the AMA also needs to capture the following elements through appropriate discounts or haircuts in the amount of insurance recognition:

- The residual term of a policy, where less than one year, as noted above;
- A policy's cancellation terms, where less than one year; and
- The uncertainty of payment as well as mismatches in coverage of insurance policies.

¹¹⁰ The Committee intends to continue an ongoing dialogue with the industry on the use of risk mitigants for operational risk and, in due course, may consider revising the criteria for and limits on the recognition of operational risk mitigants on the basis of growing experience.

D. Partial use

680. A bank will be permitted to use an AMA for some parts of its operations and the Basic Indicator Approach or Standardised Approach for the balance (partial use), provided that the following conditions are met:

- All operational risks of the bank's global, consolidated operations are captured;
- All of the bank's operations that are covered by the AMA meet the qualitative criteria for using an AMA, while those parts of its operations that are using one of the simpler approaches meet the qualifying criteria for that approach;
- On the date of implementation of an AMA, a significant part of the bank's operational risks are captured by the AMA; and
- The bank provides its supervisor with a plan specifying the timetable to which it intends to roll out the AMA across all but an immaterial part of its operations. The plan should be driven by the practicality and feasibility of moving to the AMA over time, and not for other reasons.

681. Subject to the approval of its supervisor, a bank opting for partial use may determine which parts of its operations will use an AMA on the basis of business line, legal structure, geography, or other internally determined basis.

682. Subject to the approval of its supervisor, where a bank intends to implement an approach other than the AMA on a global, consolidated basis and it does not meet the third and/or fourth conditions in paragraph 680, the bank may, in limited circumstances:

- Implement an AMA on a permanent partial basis; and
- Include in its global, consolidated operational risk capital requirements the results of an AMA calculation at a subsidiary where the AMA has been approved by the relevant host supervisor and is acceptable to the bank's home supervisor.

683. Approvals of the nature described in paragraph 682 should be granted only on an exceptional basis. Such exceptional approvals should generally be limited to circumstances where a bank is prevented from meeting these conditions due to implementation decisions of supervisors of the bank's subsidiary operations in foreign jurisdictions.

VI. Market Risk

A. The risk measurement framework

683(i). Market risk is defined as the risk of losses in on and off-balance-sheet positions arising from movements in market prices. The risks subject to this requirement are:

- The risks pertaining to interest rate related instruments and equities in the trading book;
- Foreign exchange risk and commodities risk throughout the bank.

1. Scope and coverage of the capital charges

683(ii). The capital charges for interest rate related instruments and equities will apply to the current trading book items prudently valued by banks, alongside paragraphs 690 to 701 below. The definition of trading book is set out in paragraphs 685 to 689(iii) below.

683(iii). The capital charges for foreign exchange risk and for commodities risk will apply to banks' total currency and commodity positions, subject to some discretion to exclude structural foreign exchange positions. It is understood that some of these positions will be reported and hence evaluated at market value, but some may be reported and evaluated at book value.

683(iv). For the time being, the Committee does not believe that it is necessary to allow any de minimis exemptions from the capital requirements for market risk, except for those for foreign exchange risk set out in paragraph 718(xLii) below, because this Framework applies only to internationally active banks, and then essentially on a consolidated basis; all of these banks are likely to be involved in trading to some extent.

683(v). In the same way as for credit risk, the capital requirements for market risk are to apply on a worldwide consolidated basis. Where appropriate, national authorities may permit banking and financial entities in a group which is running a global consolidated book and whose capital is being assessed on a global basis to report short and long positions in exactly the same instrument (e.g. currencies, commodities, equities or bonds), on a net basis, no matter where they are booked.¹¹¹ Moreover, the offsetting rules as set out in this section may also be applied on a consolidated basis. Nonetheless, there will be circumstances in which supervisory authorities demand that the individual positions be taken into the measurement system without any offsetting or netting against positions in the remainder of the group. This may be needed, for example, where there are obstacles to the quick repatriation of profits from a foreign subsidiary or where there are legal and procedural difficulties in carrying out the timely management of risks on a consolidated basis. Moreover, all national authorities will retain the right to continue to monitor the market risks of individual entities on a non-consolidated basis to ensure that significant imbalances within a group do not escape supervision. Supervisory authorities will be especially vigilant in ensuring that banks do not pass positions on reporting dates in such a way as to escape measurement.

684. (Deleted)

¹¹¹ The positions of less than wholly-owned subsidiaries would be subject to the generally accepted accounting principles in the country where the parent company is supervised.

685. A trading book consists of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book. To be eligible for trading book capital treatment, financial instruments must either be free of any restrictive covenants on their tradability or able to be hedged completely. In addition, positions should be frequently and accurately valued, and the portfolio should be actively managed.

686. A financial instrument is any contract that gives rise to both a financial asset of one entity and a financial liability or equity instrument of another entity. Financial instruments include both primary financial instruments (or cash instruments) and derivative financial instruments. A financial asset is any asset that is cash, the right to receive cash or another financial asset; or the contractual right to exchange financial assets on potentially favourable terms, or an equity instrument. A financial liability is the contractual obligation to deliver cash or another financial asset or to exchange financial liabilities under conditions that are potentially unfavourable.

687. Positions held with trading intent are those held intentionally for short-term resale and/or with the intent of benefiting from actual or expected short-term price movements or to lock in arbitrage profits, and may include for example proprietary positions, positions arising from client servicing (e.g. matched principal broking) and market making.

687(i). Banks must have clearly defined policies and procedures for determining which exposures to include in, and to exclude from, the trading book for purposes of calculating their regulatory capital, to ensure compliance with the criteria for trading book set forth in this Section and taking into account the bank's risk management capabilities and practices. Compliance with these policies and procedures must be fully documented and subject to periodic internal audit.

687(ii). These policies and procedures should, at a minimum, address the general considerations listed below. The list below is not intended to provide a series of tests that a product or group of related products must pass to be eligible for inclusion in the trading book. Rather, the list provides a minimum set of key points that must be addressed by the policies and procedures for overall management of a firm's trading book:

- The activities the bank considers to be trading and as constituting part of the trading book for regulatory capital purposes;
- The extent to which an exposure can be marked-to-market daily by reference to an active, liquid two-way market;
- For exposures that are marked-to-model, the extent to which the bank can:
 - (i) Identify the material risks of the exposure;
 - (ii) Hedge the material risks of the exposure and the extent to which hedging instruments would have an active, liquid two-way market;
 - (iii) Derive reliable estimates for the key assumptions and parameters used in the model.
- The extent to which the bank can and is required to generate valuations for the exposure that can be validated externally in a consistent manner;
- The extent to which legal restrictions or other operational requirements would impede the bank's ability to effect an immediate liquidation of the exposure;
- The extent to which the bank is required to, and can, actively risk manage the exposure within its trading operations; and

- The extent to which the bank may transfer risk or exposures between the banking and the trading books and criteria for such transfers.

688. The following will be the basic requirements for positions eligible to receive trading book capital treatment.

- Clearly documented trading strategy for the position/instrument or portfolios, approved by senior management (which would include expected holding horizon).
- Clearly defined policies and procedures for the active management of the position, which must include:
 - positions are managed on a trading desk;
 - position limits are set and monitored for appropriateness;
 - dealers have the autonomy to enter into/manage the position within agreed limits and according to the agreed strategy;
 - positions are marked to market at least daily and when marking to model the parameters must be assessed on a daily basis;
 - positions are reported to senior management as an integral part of the institution's risk management process; and
 - positions are actively monitored with reference to market information sources (assessment should be made of the market liquidity or the ability to hedge positions or the portfolio risk profiles). This would include assessing the quality and availability of market inputs to the valuation process, level of market turnover, sizes of positions traded in the market, etc.
- Clearly defined policy and procedures to monitor the positions against the bank's trading strategy including the monitoring of turnover and stale positions in the bank's trading book.

689. (deleted)

689(i). When a bank hedges a banking book credit risk exposure using a credit derivative booked in its trading book (i.e. using an internal hedge), the banking book exposure is not deemed to be hedged for capital purposes unless the bank purchases from an eligible third party protection provider a credit derivative meeting the requirements of paragraph 191 vis-à-vis the banking book exposure. Where such third party protection is purchased and is recognised as a hedge of a banking book exposure for regulatory capital purposes, neither the internal nor external credit derivative hedge would be included in the trading book for regulatory capital purposes.

689(ii). Positions in the bank's own eligible regulatory capital instruments are deducted from capital. Positions in other banks', securities firms', and other financial entities' eligible regulatory capital instruments, as well as intangible assets, will receive the same treatment as that set down by the national supervisor for such assets held in the banking book, which in many cases is deduction from capital. Where a bank demonstrates that it is an active market maker then a national supervisor may establish a dealer exception for holdings of other banks', securities firms', and other financial entities' capital instruments in the trading book. In order to qualify for the dealer exception, the bank must have adequate systems and controls surrounding the trading of financial institutions' eligible regulatory capital instruments.

689(iii). Term trading-related repo-style transactions that a bank accounts for in its banking book may be included in the bank's trading book for regulatory capital purposes so long as all such repo-style transactions are included. For this purpose, trading-related repo-style

transactions are defined as only those that meet the requirements of paragraphs 687 and 688 and both legs are in the form of either cash or securities includable in the trading book. Regardless of where they are booked, all repo-style transactions are subject to a banking book counterparty credit risk charge.

2. Prudent valuation guidance

690. This section provides banks with guidance on prudent valuation for positions in the trading book. This guidance is especially important for less liquid positions which, although they will not be excluded from the trading book solely on grounds of lesser liquidity, raise supervisory concerns about prudent valuation.

691. A framework for prudent valuation practices should at a minimum include the following:

(i). Systems and controls

692. Banks must establish and maintain adequate systems and controls sufficient to give management and supervisors the confidence that their valuation estimates are prudent and reliable. These systems must be integrated with other risk management systems within the organisation (such as credit analysis). Such systems must include:

- Documented policies and procedures for the process of valuation. This includes clearly defined responsibilities of the various areas involved in the determination of the valuation, sources of market information and review of their appropriateness, frequency of independent valuation, timing of closing prices, procedures for adjusting valuations, end of the month and ad-hoc verification procedures; and
- Clear and independent (i.e. independent of front office) reporting lines for the department accountable for the valuation process. The reporting line should ultimately be to a main board executive director.

(ii). Valuation methodologies

Marking to market

693. Marking-to-market is at least the daily valuation of positions at readily available close out prices that are sourced independently. Examples of readily available close out prices include exchange prices, screen prices, or quotes from several independent reputable brokers.

694. Banks must mark-to-market as much as possible. The more prudent side of bid/offer must be used unless the institution is a significant market maker in a particular position type and it can close out at mid-market.

Marking to model

695. Where marking-to-market is not possible, banks may mark-to-model, where this can be demonstrated to be prudent. Marking-to-model is defined as any valuation which has to be benchmarked, extrapolated or otherwise calculated from a market input. When marking to model, an extra degree of conservatism is appropriate. Supervisory authorities will consider the following in assessing whether a mark-to-model valuation is prudent:

- Senior management should be aware of the elements of the trading book which are subject to mark to model and should understand the materiality of the uncertainty this creates in the reporting of the risk/performance of the business.
- Market inputs should be sourced, to the extent possible, in line with market prices (as discussed above). The appropriateness of the market inputs for the particular position being valued should be reviewed regularly.
- Where available, generally accepted valuation methodologies for particular products should be used as far as possible.
- Where the model is developed by the institution itself, it should be based on appropriate assumptions, which have been assessed and challenged by suitably qualified parties independent of the development process. The model should be developed or approved independently of the front office. It should be independently tested. This includes validating the mathematics, the assumptions and the software implementation.
- There should be formal change control procedures in place and a secure copy of the model should be held and periodically used to check valuations.
- Risk management should be aware of the weaknesses of the models used and how best to reflect those in the valuation output.
- The model should be subject to periodic review to determine the accuracy of its performance (e.g. assessing continued appropriateness of the assumptions, analysis of P&L versus risk factors, comparison of actual close out values to model outputs).
- Valuation adjustments should be made as appropriate, for example, to cover the uncertainty of the model valuation (see also valuation adjustments in 698 to 701).

Independent price verification

696. Independent price verification is distinct from daily mark-to-market. It is the process by which market prices or model inputs are regularly verified for accuracy. While daily marking-to-market may be performed by dealers, verification of market prices or model inputs should be performed by a unit independent of the dealing room, at least monthly (or, depending on the nature of the market/trading activity, more frequently). It need not be performed as frequently as daily mark-to-market, since the objective, i.e. independent, marking of positions, should reveal any error or bias in pricing, which should result in the elimination of inaccurate daily marks.

697. Independent price verification entails a higher standard of accuracy in that the market prices or model inputs are used to determine profit and loss figures, whereas daily marks are used primarily for management reporting in between reporting dates. For independent price verification, where pricing sources are more subjective, e.g. only one available broker quote, prudent measures such as valuation adjustments may be appropriate.

(iii). Valuation adjustments or reserves

698. Banks must establish and maintain procedures for considering valuation adjustments/reserves. Supervisory authorities expect banks using third-party valuations to consider whether valuation adjustments are necessary. Such considerations are also necessary when marking to model.

699. Supervisory authorities expect the following valuation adjustments/reserves to be formally considered at a minimum: unearned credit spreads, close-out costs, operational risks, early termination, investing and funding costs, and future administrative costs and, where appropriate, model risk.

700. Bearing in mind that the underlying 10-day assumption in paragraph 718 (Lxxvi) (c) may not be consistent with the bank's ability to sell or hedge out positions under normal market conditions, banks must make downward valuation adjustments/reserves for these less liquid positions, and to review their continued appropriateness on an on-going basis. Reduced liquidity could arise from market events. Additionally, close-out prices for concentrated positions and/or stale positions should be considered in establishing those valuation adjustments/reserves. Banks must consider all relevant factors when determining the appropriateness of valuation adjustments/reserves for less liquid positions. These factors may include, but are not limited to, the amount of time it would take to hedge out the position/risks within the position, the average volatility of bid/offer spreads, the availability of independent market quotes (number and identity of market makers), the average and volatility of trading volumes, market concentrations, the aging of positions, the extent to which valuation relies on marking-to-model, and the impact of other model risks.

701. Valuation adjustments/reserves made under paragraph 700 must impact Tier 1 regulatory capital and may exceed those made under financial accounting standards.

3. *Methods of measuring market risks*

701(i). In measuring their market risks, a choice between two broad methodologies (described in paragraphs 709 to 718(Lxix) and 718(Lxx) to 718(xCix), respectively) will be permitted, subject to the approval of the national authorities. One alternative will be to measure the risks in a standardised manner, using the measurement frameworks described in paragraphs 709 to 718(Lxix) below. Paragraphs 709 to 718(Lv) deal with the four risks addressed in this section, i.e. interest rate, equity position, foreign exchange and commodities risk. Paragraphs 718(Lvi) to 718(Lxix) set out a number of possible methods for measuring the price risk in options of all kinds. The capital charge under the standardised measurement method will be the measures of risk obtained from paragraphs 709 to 718(Lxix), summed arithmetically.

701(ii). The alternative methodology, which is subject to the fulfilment of certain conditions and the use of which is therefore conditional upon the explicit approval of the bank's supervisory authority, is set out in 718(Lxx) to 718(xCix). This method allows banks to use risk measures derived from their own internal risk management models, subject to seven sets of conditions, namely:

- certain general criteria concerning the adequacy of the risk management system;
- qualitative standards for internal oversight of the use of models, notably by management;
- guidelines for specifying an appropriate set of market risk factors (i.e. the market rates and prices that affect the value of banks' positions);
- quantitative standards setting out the use of common minimum statistical parameters for measuring risk;
- guidelines for stress testing;
- validation procedures for external oversight of the use of models;
- rules for banks which use a mixture of models and the standardised approach.

701(iii). The standardised methodology uses a “building-block” approach in which specific risk and the general market risk arising from debt and equity positions are calculated separately. The focus of most internal models is a bank’s general market risk exposure, typically leaving specific risk (i.e. exposures to specific issuers of debt securities or equities¹¹²) to be measured largely through separate credit risk measurement systems. Banks using models should be subject to capital charges for the specific risk not captured by their models. Accordingly, a separate capital charge for specific risk will apply to each bank using a model to the extent that the model does not capture specific risk. The capital charge for banks which are modelling specific risk is set out in paragraphs 718(Lxxxvii) to 718(xcviii) of this Framework.¹¹³

701(iv). In measuring the price risk in options under the standardised approach, where a number of alternatives with varying degrees of sophistication are provided (see paragraphs 718(Lvi) to 718(Lxix)), supervisory authorities will apply the rule that the more a bank is engaged in writing options, the more sophisticated its measurement method needs to be. In the longer term, banks which are significant traders in options will be expected to move to comprehensive value-at-risk models and become subject to the full range of quantitative and qualitative standards set out in paragraphs 718(Lxx) to 718(xcix).

701(v). Each bank subject to capital charges for market risk will be expected to monitor and report the level of risk against which a capital requirement is to be applied. The bank’s overall minimum capital requirement will be:

- (a) the credit risk requirements laid down in this Framework, excluding debt and equity securities in the trading book and all positions in commodities, but including the credit counterparty risk on all over-the-counter derivatives whether in the trading or the banking books; plus
- (b) the capital charges for operational risk described in paragraphs 644 to 683 of this Framework; plus
- (c) either the capital charges for market risks described in paragraphs 709 to 718(Lxix), summed arithmetically; or
- (d) the measure of market risk derived from the models approach set out in paragraphs 718(Lxx) to 718(xcix); or
- (e) a mixture of (c) and (d) summed arithmetically.

701(vi). All transactions, including forward sales and purchases, shall be included in the calculation of capital requirements as from the date on which they were entered into. Although regular reporting will in principle take place only at intervals (in most countries quarterly), banks are expected to manage the market risk in their trading book in such a way

¹¹² Specific risk includes the risk that an individual debt or equity security moves by more or less than the general market in day-to-day trading (including periods when the whole market is volatile) and event risk (where the price of an individual debt or equity security moves precipitously relative to the general market, e.g. on a take-over bid or some other shock event; such events would also include the risk of “default”).

¹¹³ Banks that already have received specific risk model recognition for particular portfolios or lines of business according to the original version of the 1996 Market Risk Amendment should agree a timetable with their supervisors to bring their model in line with the new standards in a timely manner as is practicable, with an end date of 1 January 2010. Following that transition period, banks that have been unable to develop an acceptable methodology will have to use the standardised rules for specific risk.

that the capital requirements are being met on a continuous basis, i.e. at the close of each business day. Supervisory authorities have at their disposal a number of effective measures to ensure that banks do not “window-dress” by showing significantly lower market risk positions on reporting dates. Banks will also, of course, be expected to maintain strict risk management systems to ensure that intra-day exposures are not excessive. If a bank fails to meet the capital requirements, the national authority shall ensure that the bank takes immediate measures to rectify the situation.

4. Treatment of counterparty credit risk in the trading book

702. Banks will be required to calculate the counterparty credit risk charge for OTC derivatives, repo-style and other transactions booked in the trading book, separate from the capital charge for general market risk and specific risk.¹¹⁴ The risk weights to be used in this calculation must be consistent with those used for calculating the capital requirements in the banking book. Thus, banks using the standardised approach in the banking book will use the standardised approach risk weights in the trading book and banks using the IRB approach in the banking book will use the IRB risk weights in the trading book in a manner consistent with the IRB roll out situation in the banking book as described in paragraphs 256 to 262. For counterparties included in portfolios where the IRB approach is being used the IRB risk weights will have to be applied.

703. In the trading book, for repo-style transactions, all instruments, which are included in the trading book, may be used as eligible collateral. Those instruments which fall outside the banking book definition of eligible collateral shall be subject to a haircut at the level applicable to non-main index equities listed on recognised exchanges (as noted in paragraph 151). However, where banks are using the own estimates approach to haircutting they may also apply it in the trading book in accordance with paragraphs 154 and 155. Consequently, for instruments that count as eligible collateral in the trading book, but not in the banking book, the haircuts must be calculated for each individual security. Where banks are using a VaR approach to measuring exposure for repo-style transactions, they also may apply this approach in the trading book in accordance with paragraphs 178 to 181 (i) and Annex 4.

704. The calculation of the counterparty credit risk charge for collateralised OTC derivative transactions is the same as the rules prescribed for such transactions booked in the banking book.

705. The calculation of the counterparty charge for repo-style transactions will be conducted using the rules in paragraphs 147 to 181 (i) and Annex 4 spelt out for such transactions booked in the banking book. The firm-size adjustment for SMEs as set out in paragraph 273 shall also be applicable in the trading book.

Credit derivatives

706. (deleted)

707. The counterparty credit risk charge for single name credit derivative transactions in the trading book will be calculated using the following potential future exposure add-on factors:

¹¹⁴ The treatment for unsettled foreign exchange and securities trades is set forth in paragraph 88.

	Protection buyer	Protection seller
Total Return Swap		
“qualifying” reference obligation	5%	5%
“Non-qualifying” reference obligation	10%	10%
Credit Default Swap		
“qualifying” reference obligation	5%	5%**
“Non-qualifying” reference obligation	10%	10%**

There will be no difference depending on residual maturity.

The definition of “qualifying” is the same as for the “qualifying” category for the treatment of specific risk under the standardised measurement method in paragraph 711(i) and 711(ii).

** The protection seller of a credit default swap shall only be subject to the add-on factor where it is subject to closeout upon the insolvency of the protection buyer while the underlying is still solvent. Add-on should then be capped to the amount of unpaid premiums.

708. Where the credit derivative is a first to default transaction, the add-on will be determined by the lowest credit quality underlying in the basket, i.e. if there are any non-qualifying items in the basket, the non-qualifying reference obligation add-on should be used. For second and subsequent to default transactions, underlying assets should continue to be allocated according to the credit quality, i.e. the second lowest credit quality will determine the add-on for a second to default transaction etc.

5. *Transitional arrangements*

708(i). Banks will on a transitional basis be free to use a combination of the standardised measurement method and the internal models approach to measure their market risks. As a general rule, any such “partial” models should cover a complete risk category (e.g. interest rate risk or foreign exchange risk), i.e. a combination of the two methods will not be permitted within the same risk category.¹¹⁵ However, as most banks are at present still implementing or further improving their risk management models, the Committee believes that the banks should be given – even within risk categories – some flexibility in including all their operations on a worldwide basis; this flexibility will be subject to approval by the national authority and reviewed by the Committee in the future (supervisory authorities will take precautions against “cherry-picking” between the standardised approach and the models approach within a risk factor category). Banks which adopt the modelling alternative for any single risk category will be expected over time to include all their operations, subject to the exceptions mentioned below, and to move towards a comprehensive model (i.e. one which captures all market risk categories). Banks which adopt a model will not be permitted, save in exceptional circumstances, to revert to the standardised approach. Notwithstanding these general principles, even banks using comprehensive models to measure their market risk may still incur risks in positions which are not captured by their internal trading risk management models, for example, in remote locations, in minor currencies or in negligible business

¹¹⁵ This does not, however, apply to pre-processing techniques which are used to simplify the calculation and whose results become subject to the standardised methodology.

areas.¹¹⁶ Any such risks that are not included in a model should be separately measured and reported using the methodologies described in paragraphs 709 to 718(xviii) below.

B. The capital requirement

1. Definition of capital

708(ii). The definition of capital to be used for market risk purposes is set out in paragraphs 49(xiii) and 49(xiv) of this Framework.

708(iii). In calculating eligible capital, it will be necessary first to calculate the bank's minimum capital requirement for credit and operational risks, and only afterwards its market risk requirement, to establish how much Tier 1 and Tier 2 capital is available to support market risk. Eligible capital will be the sum of the whole of the bank's Tier 1 capital, plus all of its Tier 2 capital under the limits imposed in paragraph 49(iii) of this Framework. Tier 3 capital will be regarded as eligible only if it can be used to support market risks under the conditions set out in paragraphs 49(xxi) and 49(xxii) above. The quoted capital ratio will thus represent capital that is available to meet credit risk, operational risk, and market risk. Where a bank has Tier 3 capital, within the limits set out in paragraph 49(xxi), which is not at present supporting market risks, it may report that excess as unused but eligible Tier 3 alongside its standard ratio.

C. Market risk – The standardised measurement method

1. Interest rate risk

709. (Deleted)

709(i). This section describes the standard framework for measuring the risk of holding or taking positions in debt securities and other interest rate related instruments in the trading book. The instruments covered include all fixed-rate and floating-rate debt securities and instruments that behave like them, including non-convertible preference shares.¹¹⁷ Convertible bonds, i.e. debt issues or preference shares that are convertible, at a stated price, into common shares of the issuer, will be treated as debt securities if they trade like debt securities and as equities if they trade like equities. The basis for dealing with derivative products is considered in paragraphs 718(ix) to 718(xviii) below.

709(ii). The minimum capital requirement is expressed in terms of two separately calculated charges, one applying to the "*specific risk*" of each security, whether it is a short or a long position, and the other to the interest rate risk in the portfolio (termed "*general market risk*") where long and short positions in different securities or instruments can be offset.

¹¹⁶ For example, if a bank is hardly at all engaged in commodities it would not necessarily be expected to model its commodities risk.

¹¹⁷ Traded mortgage securities and mortgage derivative products possess unique characteristics because of the risk of pre-payment. Accordingly, for the time being, no common treatment will apply to these securities, which will be dealt with at national discretion. A security which is the subject of a repurchase or securities lending agreement will be treated as if it were still owned by the lender of the security, i.e. it will be treated in the same manner as other securities positions.

(i) *Specific risk*

709(iii). The capital charge for specific risk is designed to protect against an adverse movement in the price of an individual security owing to factors related to the individual issuer. In measuring the risk, offsetting will be restricted to matched positions in the identical issue (including positions in derivatives). Even if the issuer is the same, no offsetting will be permitted between different issues since differences in coupon rates, liquidity, call features, etc. mean that prices may diverge in the short run.

Specific risk capital charges for issuer risk

710. The new capital charges for “government” and “other” categories will be as follows.

Categories	External credit assessment	Specific risk capital charge
Government	AAA to AA-	0%
	A+ to BBB-	0.25% (residual term to final maturity 6 months or less) 1.00% (residual term to final maturity greater than 6 and up to and including 24 months) 1.60% (residual term to final maturity exceeding 24 months)
	BB+ to B-	8.00%
	Below B-	12.00%
	Unrated	8.00%
	Qualifying	
Other	Similar to credit risk charges under the standardised approach of this Framework, e.g.:	
	BB+ to BB-	8.00%
	Below BB-	12.00%
	Unrated	8.00%

710(i). The category “government” will include all forms of government¹¹⁸ paper including bonds, Treasury bills and other short-term instruments, but national authorities reserve the right to apply a specific risk weight to securities issued by certain foreign governments, especially to securities denominated in a currency other than that of the issuing government.

711. When the government paper is denominated in the domestic currency and funded by the bank in the same currency, at national discretion a lower specific risk charge may be applied.

¹¹⁸ Including, at national discretion, local and regional governments subject to a zero credit risk weight in this Framework.

711(i). The “qualifying” category includes securities issued by public sector entities and multilateral development banks, plus other securities that are:

- rated investment-grade¹¹⁹ by at least two credit rating agencies specified by the national authority; or
- rated investment-grade by one rating agency and not less than investment-grade by any other rating agency specified by the national authority (subject to supervisory oversight); or
- subject to supervisory approval, unrated, but deemed to be of comparable investment quality by the reporting bank, *and* the issuer has securities listed on a recognised stock exchange.

Each supervisory authority will be responsible for monitoring the application of these qualifying criteria, particularly in relation to the last criterion where the initial classification is essentially left to the reporting banks. National authorities will also have discretion to include within the qualifying category debt securities issued by banks in countries which have implemented this Framework, subject to the express understanding that supervisory authorities in such countries undertake prompt remedial action if a bank fails to meet the capital standards set forth in this Framework. Similarly, national authorities will have discretion to include within the qualifying category debt securities issued by securities firms that are subject to equivalent rules.

711(ii). Furthermore, the “qualifying” category shall include securities issued by institutions that are deemed to be equivalent to investment grade quality and subject to supervisory and regulatory arrangements comparable to those under this Framework.

Specific risk rules for unrated debt securities

712. Unrated securities may be included in the “qualifying” category when they are subject to supervisory approval, unrated, but deemed to be of comparable investment quality by the reporting bank, and the issuer has securities listed on a recognised stock exchange. This will remain unchanged for banks using the standardised approach. For banks using the IRB approach for a portfolio, unrated securities can be included in the “qualifying” category if both of the following conditions are met:

- the securities are rated equivalent¹²⁰ to investment grade under the reporting bank’s internal rating system, which the national supervisor has confirmed complies with the requirements for an IRB approach; and
- the issuer has securities listed on a recognised stock exchange.

Specific risk rules for non-qualifying issuers

712(i). Instruments issued by a non-qualifying issuer will receive the same specific risk charge as a non-investment grade corporate borrower under the standardised approach for credit risk under this Framework.

¹¹⁹ E.g. rated Baa or higher by Moody’s and BBB or higher by Standard and Poor’s.

¹²⁰ Equivalent means the debt security has a one-year PD equal to or less than the one year PD implied by the long-run average one-year PD of a security rated investment grade or better by a qualifying rating agency.

712(ii). However, since this may in certain cases considerably underestimate the specific risk for debt instruments which have a high yield to redemption relative to government debt securities, each national supervisor will have the discretion:

- To apply a higher specific risk charge to such instruments; and/or
- To disallow offsetting for the purposes of defining the extent of general market risk between such instruments and any other debt instruments.

In that respect, securitisation exposures that would be subject to a deduction treatment under the securitisation framework set forth in this Framework (e.g. equity tranches that absorb first loss), as well as securitisation exposures that are unrated liquidity lines or letters of credit should be subject to a capital charge that is no less than the charge set forth in the securitisation framework.

Specific risk capital charges for positions hedged by credit derivatives

713. Full allowance will be recognised when the values of two legs (i.e. long and short) always move in the opposite direction and broadly to the same extent. This would be the case in the following situations:

- (a) the two legs consist of completely identical instruments, or
- (b) a long cash position is hedged by a total rate of return swap (or vice versa) and there is an exact match between the reference obligation and the underlying exposure (i.e. the cash position).¹²¹

In these cases, no specific risk capital requirement applies to both sides of the position.

714. An 80% offset will be recognised when the value of two legs (i.e. long and short) always moves in the opposite direction but not broadly to the same extent. This would be the case when a long cash position is hedged by a credit default swap or a credit linked note (or vice versa) and there is an exact match in terms of the reference obligation, the maturity of both the reference obligation and the credit derivative, and the currency of the underlying exposure. In addition, key features of the credit derivative contract (e.g. credit event definitions, settlement mechanisms) should not cause the price movement of the credit derivative to materially deviate from the price movements of the cash position. To the extent that the transaction transfers risk (i.e. taking account of restrictive payout provisions such as fixed payouts and materiality thresholds), an 80% specific risk offset will be applied to the side of the transaction with the higher capital charge, while the specific risk requirement on the other side will be zero.

715. Partial allowance will be recognised when the value of the two legs (i.e. long and short) usually moves in the opposite direction. This would be the case in the following situations:

- (a) the position is captured in paragraph 713 under (b), but there is an asset mismatch between the reference obligation and the underlying exposure. Nonetheless, the position meets the requirements in paragraph 191 (g).

¹²¹ The maturity of the swap itself may be different from that of the underlying exposure.

- (b) The position is captured in paragraph 713 under (a) or 714 but there is a currency or maturity mismatch¹²² between the credit protection and the underlying asset.
- (c) The position is captured in paragraph 714 but there is an asset mismatch between the cash position and the credit derivative. However, the underlying asset is included in the (deliverable) obligations in the credit derivative documentation.

716. In each of these cases in paragraphs 713 to 715, the following rule applies. Rather than adding the specific risk capital requirements for each side of the transaction (i.e. the credit protection and the underlying asset) only the higher of the two capital requirements will apply.

717. In cases not captured in paragraphs 713 to 715, a specific risk capital charge will be assessed against both sides of the position.

718. With regard to banks' first-to-default and second-to-default products in the trading book, the basic concepts developed for the banking book will also apply. Banks holding long positions in these products (e.g. buyers of basket credit linked notes) would be treated as if they were protection sellers and would be required to add the specific risk charges or use the external rating if available. Issuers of these notes would be treated as if they were protection buyers and are therefore allowed to off-set specific risk for one of the underlyings, i.e. the asset with the lowest specific risk charge.

(ii) *General market risk*

718(i). *The capital requirements for general market risk are designed to capture the risk of loss arising from changes in market interest rates. A choice between two principal methods of measuring the risk is permitted, a "maturity" method and a "duration" method. In each method, the capital charge is the sum of four components:*

- The net short or long position in the whole trading book;
- A small proportion of the matched positions in each time-band (the "vertical disallowance");
- A larger proportion of the matched positions across different time-bands (the "horizontal disallowance");
- A net charge for positions in options, where appropriate (see paragraphs 718(Lxvi) to 718(Lxix)).

718(ii). Separate maturity ladders should be used for each currency and capital charges should be calculated for each currency separately and then summed with no offsetting between positions of opposite sign. In the case of those currencies in which business is insignificant, separate maturity ladders for each currency are not required. Rather, the bank may construct a single maturity ladder and slot, within each appropriate time-band, the net long or short position for each currency. However, these individual net positions are to be summed within each time-band, irrespective of whether they are long or short positions, to produce a gross position figure.

¹²² Currency mismatches should feed into the normal reporting of foreign exchange risk.

718(iii). In the **maturity method** (see paragraph 718(vii) for the duration method), long or short positions in debt securities and other sources of interest rate exposures including derivative instruments are slotted into a maturity ladder comprising thirteen time-bands (or fifteen time-bands in case of low coupon instruments). Fixed rate instruments should be allocated according to the residual term to maturity and floating-rate instruments according to the residual term to the next repricing date. Opposite positions of the same amount in the same issues (but not different issues by the same issuer), whether actual or notional, can be omitted from the interest rate maturity framework, as well as closely matched swaps, forwards, futures and FRAs which meet the conditions set out in paragraphs 718(xiii) and 718(xiv) below.

718(iv). The first step in the calculation is to weight the positions in each time-band by a factor designed to reflect the price sensitivity of those positions to assumed changes in interest rates. The weights for each time-band are set out in the table below. Zero-coupon bonds and deep-discount bonds (defined as bonds with a coupon of less than 3%) should be slotted according to the time-bands set out in the second column of the table.

Maturity method: time-bands and weights

Coupon 3% or more	Coupon less than 3%	Risk weight	Assumed changes in yield
1 month or less	1 month or less	0.00%	1.00
1 to 3 months	1 to 3 months	0.20%	1.00
3 to 6 months	3 to 6 months	0.40%	1.00
6 to 12 months	6 to 12 months	0.70%	1.00
1 to 2 years	1.0 to 1.9 years	1.25%	0.90
2 to 3 years	1.9 to 2.8 years	1.75%	0.80
3 to 4 years	2.8 to 3.6 years	2.25%	0.75
4 to 5 years	3.6 to 4.3 years	2.75%	0.75
5 to 7 years	4.3 to 5.7 years	3.25%	0.70
7 to 10 years	5.7 to 7.3 years	3.75%	0.65
10 to 15 years	7.3 to 9.3 years	4.50%	0.60
15 to 20 years	9.3 to 10.6 years	5.25%	0.60
over 20 years	10.6 to 12 years	6.00%	0.60
	12 to 20 years	8.00%	0.60
	over 20 years	12.50%	0.60

718(v). The next step in the calculation is to offset the weighted longs and shorts in each time-band, resulting in a single short or long position for each band. Since, however, each band would include different instruments and different maturities, a 10% capital charge to reflect basis risk and gap risk will be levied on the smaller of the offsetting positions, be it long or short. Thus, if the sum of the weighted longs in a time-band is \$100 million and the sum of the weighted shorts \$90 million, the so-called “vertical disallowance” for that time-band would be 10% of \$90 million (i.e. \$9.0 million).

718(vi). The result of the above calculations is to produce two sets of weighted positions, the net long or short positions in each time-band (\$10 million long in the example above) and the vertical disallowances, which have no sign. In addition, however, banks will be allowed to conduct two rounds of “horizontal offsetting”, first between the net positions in each of three zones (zero to one year, one year to four years and four years and over),¹²³ and subsequently between the net positions in the three different zones. The offsetting will be subject to a scale of disallowances expressed as a fraction of the matched positions, as set out in the table below. The weighted long and short positions in each of three zones may be offset, subject to the matched portion attracting a disallowance factor that is part of the capital charge. The residual net position in each zone may be carried over and offset against opposite positions in other zones, subject to a second set of disallowance factors.

Horizontal disallowances

Zones ¹²⁴	Time-band	within the zone	between adjacent zones	between zones 1 and 3
Zone 1	0 - 1 month 1 - 3 months 3 - 6 months 6 - 12 months	40%	40%	100%
Zone 2	1 - 2 years 2 - 3 years 3 - 4 years 4 - 5 years	30%		
Zone 3	5 - 7 years 7 - 10 years 10 - 15 years 15 - 20 years over 20 years	30%	40%	

718(vii). Under the alternative **duration method**, banks with the necessary capability may, with their supervisors’ consent, use a more accurate method of measuring all of their general market risk by calculating the price sensitivity of each position separately. Banks must elect and use the method on a continuous basis (unless a change in method is approved by the national authority) and will be subject to supervisory monitoring of the systems used. The mechanics of this method are as follows:

- First calculate the price sensitivity of each instrument in terms of a change in interest rates of between 0.6 and 1.0 percentage points depending on the maturity of the instrument (see the table below);
- Slot the resulting sensitivity measures into a duration-based ladder with the fifteen time-bands set out in the table below;

¹²³ The zones for coupons less than 3% are 0 to 1 year, 1 to 3.6 years, and 3.6 years and over.

¹²⁴ The zones for coupons less than 3% are 0 to 1 year, 1 to 3.6 years, and 3.6 years and over.

- Subject long and short positions in each time-band to a 5% vertical disallowance designed to capture basis risk;
- Carry forward the net positions in each time-band for horizontal offsetting subject to the disallowances set out in table paragraph 718(vi) above.

Duration method: time-bands and assumed changes in yield

		Assumed change in yield			Assumed change in yield
Zone 1			Zone 3		
1	month or less	1.00	3.6 to	4.3 years	0.75
1	to 3 months	1.00	4.3 to	5.7 years	0.70
3	to 6 months	1.00	5.7 to	7.3 years	0.65
6	to 12 months	1.00	7.3 to	9.3 years	0.60
			9.3 to	10.6 years	0.60
Zone 2			10.6 to	12 years	0.60
1.0 to	1.9 years	0.90	12 to	20 years	0.60
1.9 to	2.8 years	0.80	over	20 years	0.60
2.8 to	3.6 years	0.75			

718(viii). In the case of **residual currencies** (see paragraph 718(ii) above) the gross positions in each time-band will be subject to either the risk weightings set out in paragraph 718(iv), if positions are reported using the maturity method, or the assumed change in yield set out in paragraph 718(vii), if positions are reported using the duration method, with no further offsets.

(iii) Interest rate derivatives

718(ix). The measurement system should include all interest rate derivatives and off-balance-sheet instruments in the trading book which react to changes in interest rates, (e.g. forward rate agreements (FRAs), other forward contracts, bond futures, interest rate and cross-currency swaps and forward foreign exchange positions). Options can be treated in a variety of ways as described in paragraphs 718(Lvi) to 718(Lxix) below. A summary of the rules for dealing with interest rate derivatives is set out in paragraph 718(xviii) below.

Calculation of positions

718(x). The derivatives should be converted into positions in the relevant underlying and become subject to specific and general market risk charges as described above. In order to calculate the standard formula described above, the amounts reported should be the market value of the principal amount of the underlying or of the notional underlying resulting from the prudent valuation guidance set out in paragraphs 690 to 701 above.¹²⁵

Futures and forward contracts, including forward rate agreements

718(xi). These instruments are treated as a combination of a long and a short position in a notional government security. The maturity of a future or a FRA will be the period until delivery or exercise of the contract, plus - where applicable - the life of the underlying

¹²⁵ For instruments where the apparent notional amount differs from the effective notional amount, banks must use the effective notional amount.

instrument. For example, a long position in a June three month interest rate future (taken in April) is to be reported as a long position in a government security with a maturity of five months and a short position in a government security with a maturity of two months. Where a range of deliverable instruments may be delivered to fulfil the contract, the bank has flexibility to elect which deliverable security goes into the maturity or duration ladder but should take account of any conversion factor defined by the exchange. In the case of a future on a corporate bond index, positions will be included at the market value of the notional underlying portfolio of securities.

Swaps

718(xii). Swaps will be treated as two notional positions in government securities with relevant maturities. For example, an interest rate swap under which a bank is receiving floating rate interest and paying fixed will be treated as a long position in a floating rate instrument of maturity equivalent to the period until the next interest fixing and a short position in a fixed-rate instrument of maturity equivalent to the residual life of the swap. For swaps that pay or receive a fixed or floating interest rate against some other reference price, e.g. a stock index, the interest rate component should be slotted into the appropriate repricing maturity category, with the equity component being included in the equity framework. The separate legs of cross-currency swaps are to be reported in the relevant maturity ladders for the currencies concerned.

Calculation of capital charges for derivatives under the standardised methodology

Allowable offsetting of matched positions

718(xiii). Banks may exclude from the interest rate maturity framework altogether (for both specific and general market risk) long and short positions (both actual and notional) in identical instruments with exactly the same issuer, coupon, currency and maturity. A matched position in a future or forward and its corresponding underlying may also be fully offset,¹²⁶ and thus excluded from the calculation. When the future or the forward comprises a range of deliverable instruments offsetting of positions in the future or forward contract and its underlying is only permissible in cases where there is a readily identifiable underlying security which is most profitable for the trader with a short position to deliver. The price of this security, sometimes called the “cheapest-to-deliver”, and the price of the future or forward contract should in such cases move in close alignment. No offsetting will be allowed between positions in different currencies; the separate legs of cross-currency swaps or forward foreign exchange deals are to be treated as notional positions in the relevant instruments and included in the appropriate calculation for each currency.

718(xiv). In addition, opposite positions in the same category of instruments¹²⁷ can in certain circumstances be regarded as matched and allowed to offset fully. To qualify for this treatment the positions must relate to the same underlying instruments, be of the same nominal value and be denominated in the same currency.¹²⁸ In addition:

¹²⁶ The leg representing the time to expiry of the future should, however, be reported.

¹²⁷ This includes the delta-equivalent value of options. The delta equivalent of the legs arising out of the treatment of caps and floors as set out in paragraph 718(Lx) can also be offset against each other under the rules laid down in this paragraph.

¹²⁸ The separate legs of different swaps may also be “matched” subject to the same conditions.

- (i) **for futures:** offsetting positions in the notional or underlying instruments to which the futures contract relates must be for identical products and mature within seven days of each other;
- (ii) **for swaps and FRAs:** the reference rate (for floating rate positions) must be identical and the coupon closely matched (i.e. within 15 basis points); and
- (iii) **for swaps, FRAs and forwards:** the next interest fixing date or, for fixed coupon positions or forwards, the residual maturity must correspond within the following limits:
 - less than one month hence: same day;
 - between one month and one year hence: within seven days;
 - over one year hence: within thirty days.

718(xv). Banks with large swap books may use alternative formulae for these swaps to calculate the positions to be included in the maturity or duration ladder. One method would be to first convert the payments required by the swap into their present values. For that purpose, each payment should be discounted using zero coupon yields, and a single net figure for the present value of the cash flows entered into the appropriate time-band using procedures that apply to zero (or low) coupon bonds; these figures should be slotted into the general market risk framework as set out above. An alternative method would be to calculate the sensitivity of the net present value implied by the change in yield used in the maturity or duration method and allocate these sensitivities into the time-bands set out in paragraph 718(iv) or paragraph 718(vii). Other methods which produce similar results could also be used. Such alternative treatments will, however, only be allowed if:

- the supervisory authority is fully satisfied with the accuracy of the systems being used;
- the positions calculated fully reflect the sensitivity of the cash flows to interest rate changes and are entered into the appropriate time-bands;
- the positions are denominated in the same currency.

Specific risk

718(xvi). Interest rate and currency swaps, FRAs, forward foreign exchange contracts and interest rate futures will not be subject to a specific risk charge. This exemption also applies to futures on an interest rate index (e.g. LIBOR). However, in the case of futures contracts where the underlying is a debt security, or an index representing a basket of debt securities, a specific risk charge will apply according to the credit risk of the issuer as set out in paragraphs 709(iii) to 718 above.

General market risk

718(xvii). General market risk applies to positions in all derivative products in the same manner as for cash positions, subject only to an exemption for fully or very closely matched positions in identical instruments as defined in paragraphs 718(xiii) and 718(xiv). The various categories of instruments should be slotted into the maturity ladder and treated according to the rules identified earlier.

718(xviii). The table below presents a summary of the regulatory treatment for interest rate derivatives, for market risk purposes.

Summary of treatment of interest rate derivatives

Instrument	Specific risk charge ¹²⁹	General market risk charge
Exchange-traded future		
- Government debt security	Yes ¹³⁰	Yes, as two positions
- Corporate debt security	Yes	Yes, as two positions
- Index on interest rates (e.g. LIBOR)	No	Yes, as two positions
OTC forward		
- Government debt security	Yes ¹³⁰	Yes, as two positions
- Corporate debt security	Yes	Yes, as two positions
- Index on interest rates	No	Yes, as two positions
FRAs, Swaps	No	Yes, as two positions
Forward foreign exchange	No	Yes, as one position in each currency
Options		Either
- Government debt security	Yes ¹³⁰	(a) Carve out together with the associated hedging positions - simplified approach - scenario analysis - internal models (Part B)
- Corporate debt security	Yes	(b) General market risk charge according to the delta-plus method (gamma and vega should receive separate capital charges)
- Index on interest rates	No	
- FRAs, Swaps	No	

2. *Equity position risk*

718(xix). This section sets out a minimum capital standard to cover the risk of holding or taking positions in equities in the trading book. It applies to long and short positions in all instruments that exhibit market behaviour similar to equities, but not to non-convertible preference shares (which are covered by the interest rate risk requirements described in paragraphs 709 to 718(xviii)). Long and short positions in the same issue may be reported on a net basis. The instruments covered include common stocks, whether voting or non-voting, convertible securities that behave like equities, and commitments to buy or sell equity securities. The treatment of derivative products, stock indices and index arbitrage is described in paragraphs 718(xxii) to 718(xxix) below.

¹²⁹ This is the specific risk charge relating to the issuer of the instrument. Under the existing credit risk rules, there remains a separate capital charge for the counterparty risk.

¹³⁰ The specific risk capital charge only applies to government debt securities that are rated below AA- (see paragraphs 710 and 710 (i)).

(i). *Specific and general market risk*

718(xx). As with debt securities, the minimum capital standard for equities is expressed in terms of two separately calculated charges for the “specific risk” of holding a long or short position in an individual equity and for the “general market risk” of holding a long or short position in the market as a whole. Specific risk is defined as the bank’s gross equity positions (i.e. the sum of all long equity positions and of all short equity positions) and general market risk as the difference between the sum of the longs and the sum of the shorts (i.e. the overall net position in an equity market). The long or short position in the market must be calculated on a market-by-market basis, i.e. a separate calculation has to be carried out for each national market in which the bank holds equities.

718(xxi). The capital charge for *specific* risk will be 8%, unless the portfolio is both liquid and well-diversified, in which case the charge will be 4%. Given the different characteristics of national markets in terms of marketability and concentration, national authorities will have discretion to determine the criteria for liquid and diversified portfolios. The *general market risk* charge will be 8%.

(ii). *Equity derivatives*

718(xxii). Except for options, which are dealt with in paragraphs 718(Lvi) to 718(Lxix), equity derivatives and off-balance-sheet positions which are affected by changes in equity prices should be included in the measurement system.¹³¹ This includes futures and swaps on both individual equities and on stock indices. The derivatives are to be converted into positions in the relevant underlying. The treatment of equity derivatives is summarised in paragraph 718(xxix) below.

Calculation of positions

718(xxiii). In order to calculate the standard formula for specific and general market risk, positions in derivatives should be converted into notional equity positions:

- Futures and forward contracts relating to individual equities should in principle be reported at current market prices;
- Futures relating to stock indices should be reported as the marked-to-market value of the notional underlying equity portfolio;
- Equity swaps are to be treated as two notional positions;¹³²
- Equity options and stock index options should be either “carved out” together with the associated underlyings or be incorporated in the measure of general market risk described in this section according to the delta-plus method.

¹³¹ Where equities are part of a forward contract, a future or an option (quantity of equities to be received or to be delivered), any interest rate or foreign currency exposure from the other leg of the contract should be reported as set out in paragraphs 709 to 718(xviii) and 718(xxx) to 718(xLii).

¹³² For example, an equity swap in which a bank is receiving an amount based on the change in value of one particular equity or stock index and paying a different index will be treated as a long position in the former and a short position in the latter. Where one of the legs involves receiving/paying a fixed or floating interest rate, that exposure should be slotted into the appropriate repricing time-band for interest rate related instruments as set out in paragraphs 709 to 718(xviii). The stock index should be covered by the equity treatment.

Calculation of capital charges

Measurement of specific and general market risk

718(xxiv). Matched positions in each identical equity or stock index in each market may be fully offset, resulting in a single net short or long position to which the specific and general market risk charges will apply. For example, a future in a given equity may be offset against an opposite cash position in the same equity.¹³³

Risk in relation to an index

718(xxv). Besides general market risk, a further capital charge of 2% will apply to the net long or short position in an index contract comprising a diversified portfolio of equities. This capital charge is intended to cover factors such as execution risk. National supervisory authorities will take care to ensure that this 2% risk weight applies only to well-diversified indices and not, for example, to sectoral indices.

Arbitrage

718(xxvi). In the case of the futures-related arbitrage strategies described below, the additional 2% capital charge described above may be applied to only one index with the opposite position exempt from a capital charge. The strategies are:

- When the bank takes an opposite position in exactly the same index at different dates or in different market centres;
- When the bank has an opposite position in contracts at the same date in different but similar indices, subject to supervisory oversight that the two indices contain sufficient common components to justify offsetting.

718(xxvii). Where a bank engages in a deliberate arbitrage strategy, in which a futures contract on a broadly-based index matches a basket of stocks, it will be allowed to carve out both positions from the standardised methodology on condition that:

- The trade has been deliberately entered into and separately controlled;
- The composition of the basket of stocks represents at least 90% of the index when broken down into its notional components.

In such a case the minimum capital requirement will be 4% (i.e. 2% of the gross value of the positions on each side) to reflect divergence and execution risks. This applies even if all of the stocks comprising the index are held in identical proportions. Any excess value of the stocks comprising the basket over the value of the futures contract or excess value of the futures contract over the value of the basket is to be treated as an open long or short position.

718(xxviii). If a bank takes a position in depository receipts against an opposite position in the underlying equity or identical equities in different markets, it may offset the position (i.e.

¹³³ The interest rate risk arising out of the future, however, should be reported as set out in paragraphs 709 to 718(xviii).

bear no capital charge) but only on condition that any costs on conversion are fully taken into account.¹³⁴

718(xxix). The table below summarises the regulatory treatment of equity derivatives for market risk purposes.

Summary of treatment of equity derivatives

Instrument	Specific risk ¹³⁵	General market risk
Exchange-traded or OTC-Future		
- Individual equity	Yes	Yes, as underlying
- Index	2%	Yes, as underlying
Options		
- Individual equity	Yes	Either
		(a) Carve out together with the associated hedging positions - simplified approach - scenario analysis - internal models (Part B)
- Index	2%	(b) General market risk charge according to the delta-plus method (gamma and vega should receive separate capital charges)

3. *Foreign exchange risk*

718(xxx). This section sets out a minimum capital standard to cover the risk of holding or taking positions in foreign currencies, including gold.¹³⁶

718(xxxi). Two processes are needed to calculate the capital requirement for foreign exchange risk. The first is to measure the exposure in a single currency position. The second is to measure the risks inherent in a bank's mix of long and short positions in different currencies.

(i). *Measuring the exposure in a single currency*

718(xxxii). The bank's net open position in each currency should be calculated by summing:

¹³⁴ Any foreign exchange risk arising out of these positions has to be reported as set out in paragraphs 718(xxx) to 718(xlvii).

¹³⁵ This is the specific risk charge relating to the issuer of the instrument. Under the existing credit risk rules, there remains a separate capital charge for the counterparty risk.

¹³⁶ Gold is to be dealt with as a foreign exchange position rather than a commodity because its volatility is more in line with foreign currencies and banks manage it in a similar manner to foreign currencies.

- The net spot position (i.e. all asset items less all liability items, including accrued interest, denominated in the currency in question);
- The net forward position (i.e. all amounts to be received less all amounts to be paid under forward foreign exchange transactions, including currency futures and the principal on currency swaps not included in the spot position);
- Guarantees (and similar instruments) that are certain to be called and are likely to be irrecoverable;
- Net future income/expenses not yet accrued but already fully hedged (at the discretion of the reporting bank);
- Depending on particular accounting conventions in different countries, any other item representing a profit or loss in foreign currencies;
- The net delta-based equivalent of the total book of foreign currency options.¹³⁷

718(xxxiii). Positions in composite currencies need to be separately reported but, for measuring banks' open positions, may be either treated as a currency in their own right or split into their component parts on a consistent basis. Positions in gold should be measured in the same manner as described in paragraph 718(xLix).¹³⁸

718(xxxiv). Three aspects call for more specific comment: the treatment of interest, other income and expenses; the measurement of forward currency positions and gold; and the treatment of "structural" positions.

The treatment of interest, other income and expenses

718(xxxv). Interest accrued (i.e. earned but not yet received) should be included as a position. Accrued expenses should also be included. Unearned but expected future interest and anticipated expenses may be excluded unless the amounts are certain and banks have taken the opportunity to hedge them. If banks include future income/expenses they should do so on a consistent basis, and not be permitted to select only those expected future flows which reduce their position.

The measurement of forward currency and gold positions

718(xxxvi). Forward currency and gold positions will normally be valued at current spot market exchange rates. Using forward exchange rates would be inappropriate since it would result in the measured positions reflecting current interest rate differentials to some extent. However, banks which base their normal management accounting on net present values are expected to use the net present values of each position, discounted using current interest rates and valued at current spot rates, for measuring their forward currency and gold positions.

¹³⁷ Subject to a separately calculated capital charge for gamma and vega as described in paragraphs 718(Lix) to 718(Lxii); alternatively, options and their associated underlyings are subject to one of the other methods described in paragraphs 718(Lvi) to 718(Lxix).

¹³⁸ Where gold is part of a forward contract (quantity of gold to be received or to be delivered), any interest rate or foreign currency exposure from the other leg of the contract should be reported as set out in paragraphs 709 to 718(xviii) and 718(xxxii) above.

The treatment of structural positions

718(xxxvii). A matched currency position will protect a bank against loss from movements in exchange rates, but will not necessarily protect its capital adequacy ratio. If a bank has its capital denominated in its domestic currency and has a portfolio of foreign currency assets and liabilities that is completely matched, its capital/asset ratio will fall if the domestic currency depreciates. By running a short position in the domestic currency the bank can protect its capital adequacy ratio, although the position would lead to a loss if the domestic currency were to appreciate.

718(xxxviii). Supervisory authorities are free to allow banks to protect their capital adequacy ratio in this way. Thus, any positions which a bank has deliberately taken in order to hedge partially or totally against the adverse effect of the exchange rate on its capital ratio may be excluded from the calculation of net open currency positions, subject to each of the following conditions being met:

- Such positions need to be of a “structural”, i.e. of a non-dealing, nature (the precise definition to be set by national authorities according to national accounting standards and practices);
- The national authority needs to be satisfied that the “structural” position excluded does no more than protect the bank’s capital adequacy ratio;
- Any exclusion of the position needs to be applied consistently, with the treatment of the hedge remaining the same for the life of the assets or other items.

718(xxxix). No capital charge need apply to positions related to items that are deducted from a bank’s capital when calculating its capital base, such as investments in non-consolidated subsidiaries, nor to other long-term participations denominated in foreign currencies which are reported in the published accounts at historic cost. These may also be treated as structural positions.

(ii). Measuring the foreign exchange risk in a portfolio of foreign currency positions and gold

718(xL). Banks will have a choice between two alternative measures at supervisory discretion; a “shorthand” method which treats all currencies equally; and the use of internal models which takes account of the actual degree of risk dependent on the composition of the bank’s portfolio. The conditions for the use of internal models are set out in paragraphs 718(Lxx) to 718(xcix) below.

718(xLi). Under the shorthand method, the nominal amount (or net present value) of the net position in each foreign currency and in gold is converted at spot rates into the reporting currency.¹³⁹ The overall net open position is measured by aggregating:

- The sum of the net short positions or the sum of the net long positions, whichever is the greater;¹⁴⁰ plus

¹³⁹ Where the bank is assessing its foreign exchange risk on a consolidated basis, it may be technically impractical in the case of some marginal operations to include the currency positions of a foreign branch or subsidiary of the bank. In such cases the internal limit in each currency may be used as a proxy for the positions. Provided there is adequate ex post monitoring of actual positions against such limits, the limits should be added, without regard to sign, to the net open position in each currency.

- The net position (short or long) in gold, regardless of sign.

The capital charge will be 8% of the overall net open position (see example below).

Example of the shorthand measure of foreign exchange risk

YEN	EUR	GB£	CA\$	US\$	GOLD
+ 50	+ 100	+ 150	- 20	- 180	- 35
	+ 300		- 200		35

The capital charge would be 8% of the higher of either the net long currency positions or the net short currency positions (i.e. 300) and of the net position in gold (35) = $335 \times 8\% = 26.8$.

718(xLii). A bank doing negligible business in foreign currency and which does not take foreign exchange positions for its own account may, at the discretion of its national authority, be exempted from capital requirements on these positions provided that:

- Its foreign currency business, defined as the greater of the sum of its gross long positions and the sum of its gross short positions in all foreign currencies, does not exceed 100% of eligible capital as defined in paragraphs 49(xxi) and 49(xxii); **and**
- Its overall net open position as defined in the paragraph above does not exceed 2% of its eligible capital as defined in paragraphs 49(xxi) and 49(xxii)

4. **Commodities risk**

718(xLiii). This section establishes a minimum capital standard to cover the risk of holding or taking positions in commodities, including precious metals, but excluding gold (which is treated as a foreign currency according to the methodology set out in paragraphs 718(xxx) to 718(xLii) above). A commodity is defined as a physical product which is or can be traded on a secondary market, e.g. agricultural products, minerals (including oil) and precious metals.

718(xLIV). The price risk in commodities is often more complex and volatile than that associated with currencies and interest rates. Commodity markets may also be less liquid than those for interest rates and currencies and, as a result, changes in supply and demand can have a more dramatic effect on price and volatility.¹⁴¹ These market characteristics can make price transparency and the effective hedging of commodities risk more difficult.

718(xLV). For spot or physical trading, the directional risk arising from a change in the spot price is the most important risk. However, banks using portfolio strategies involving forward and derivative contracts are exposed to a variety of additional risks, which may well be larger than the risk of a change in spot prices. These include:

- Basis risk (the risk that the relationship between the prices of similar commodities alters through time);

¹⁴⁰ An alternative calculation, which produces an identical result, is to include the reporting currency as a residual and to take the sum of all the short (or long) positions.

¹⁴¹ Banks need also to guard against the risk that arises when the short position falls due before the long position. Owing to a shortage of liquidity in some markets it might be difficult to close the short position and the bank might be squeezed by the market.

- Interest rate risk (the risk of a change in the cost of carry for forward positions and options);
- Forward gap risk (the risk that the forward price may change for reasons other than a change in interest rates);

In addition banks may face credit counterparty risk on over-the-counter derivatives, but this is captured by one of the methods set out in Annex 4 of this Framework. The funding of commodities positions may well open a bank to interest rate or foreign exchange exposure and if that is so the relevant positions should be included in the measures of interest rate and foreign exchange risk described in paragraphs 709 to 718(xviii) and paragraphs 718(xxx) to 718(xLii), respectively.¹⁴²

718(xLvi). There are three alternatives for measuring commodities position risk which are described in paragraphs 718(xLviii) to 718(LV) below. As with other categories of market risk, banks may use models subject to the conditions set out in paragraphs 718(Lxx) to 718(xcix). Commodities risk can also be measured in a standardised manner, using either a very simple framework (paragraphs 718(Liv) and 718(LV) below) or a measurement system which captures forward gap and interest rate risk separately by basing the methodology on seven time-bands (paragraphs 718(xLix) to 718(Liii) below). Both the simplified approach and the maturity ladder approach are appropriate only for banks which, in relative terms, conduct only a limited amount of commodities business. Major traders would be expected over time to adopt a models approach subject to the safeguards set out in paragraphs 718(Lxx) to 718(xcix).

718(xLvii). For the maturity ladder approach and the simplified approach, long and short positions in each commodity may be reported on a net basis for the purposes of calculating open positions. However, positions in different commodities will as a general rule not be offsettable in this fashion. Nevertheless, national authorities will have discretion to permit netting between different sub-categories¹⁴³ of the same commodity in cases where the sub-categories are deliverable against each other. They can also be considered as offsettable if they are close substitutes against each other and a minimum correlation of 0.9 between the price movements can be clearly established over a minimum period of one year. However, a bank wishing to base its calculation of capital charges for commodities on correlations would have to satisfy the relevant supervisory authority of the accuracy of the method which has been chosen and obtain its prior approval. Where banks use the models approach they can offset long and short positions in different commodities to a degree which is determined by empirical correlations, in the same way as a limited degree of offsetting is allowed, for instance, between interest rates in different currencies.

¹⁴² Where a commodity is part of a forward contract (quantity of commodities to be received or to be delivered), any interest rate or foreign currency exposure from the other leg of the contract should be reported as set out in paragraphs 709 to 718(xviii) and paragraphs 718(xxx) to 718(xLii). Positions which are purely stock financing (i.e. a physical stock has been sold forward and the cost of funding has been locked in until the date of the forward sale) may be omitted from the commodities risk calculation although they will be subject to interest rate and counterparty risk requirements.

¹⁴³ Commodities can be grouped into clans, families, sub-groups and individual commodities. For example, a clan might be Energy Commodities, within which Hydro-Carbons are a family with Crude Oil being a sub-group and West Texas Intermediate, Arabian Light and Brent being individual commodities.

(i) *Models for measuring commodities risk*

718(xlviii). Banks may choose to adopt the models approach as set out in paragraphs 718(Lxx) to 718(xcix). It is essential that the methodology used encompasses:

- Directional risk, to capture the exposure from changes in spot prices arising from net open positions;
- Forward gap and interest rate risk, to capture the exposure to changes in forward prices arising from maturity mismatches; and
- Basis risk, to capture the exposure to changes in the price relationships between two similar, but not identical, commodities.

It is also particularly important that models take proper account of market characteristics - notably delivery dates and the scope provided to traders to close out positions.

(ii) *Maturity ladder approach*

718(xlix). In calculating the capital charges under this approach banks will first have to express each commodity position (spot plus forward) in terms of the standard unit of measurement (barrels, kilos, grams etc.). The net position in each commodity will then be converted at current spot rates into the national currency.

718(L). Secondly, in order to capture forward gap and interest rate risk within a time-band (which, together, are sometimes referred to as curvature/spread risk), matched long and short positions in each time-band will carry a capital charge. The methodology will be rather similar to that used for interest rate related instruments as set out in paragraphs 709 to 718(xviii). Positions in the separate commodities (expressed in terms of the standard unit of measurement) will first be entered into a maturity ladder while physical stocks should be allocated to the first time-band. A separate maturity ladder will be used for each commodity as defined in paragraph 718(xlvii) above.¹⁴⁴ For each time-band, the sum of short and long positions which are matched will be multiplied first by the spot price for the commodity, and then by the appropriate spread rate for that band (as set out in the table below).

¹⁴⁴ For markets which have daily delivery dates, any contracts maturing within ten days of one another may be offset.

Time-bands and spread rates

Time-band	Spread rate
0 - 1 month	1.5%
1 - 3 months	1.5%
3 - 6 months	1.5%
6 - 12 months	1.5%
1 - 2 years	1.5%
2 - 3 years	1.5%
over 3 years	1.5%

718(Li). The residual net positions from nearer time-bands may then be carried forward to offset exposures in time-bands that are further out. However, recognising that such hedging of positions among different time-bands is imprecise, a surcharge equal to 0.6% of the net position carried forward will be added in respect of each time-band that the net position is carried forward. The capital charge for each matched amount created by carrying net positions forward will be calculated as in paragraph 718(L) above. At the end of this process a bank will have either only long or only short positions, to which a capital charge of 15% will apply.

718(Lii). Even though the Committee is aware that there are differences in volatility between different commodities, it has decided in the interest of simplicity, and given the fact that banks normally run rather small open positions in commodities, that one uniform capital charge for open positions in all commodities should apply. Those banks which desire to be more precise in this area may choose to adopt the models approach.

718(Liii). All commodity derivatives and off-balance-sheet positions which are affected by changes in commodity prices should be included in this measurement framework. This includes commodity futures, commodity swaps, and options where the "delta plus" method¹⁴⁵ is used (see paragraphs 718(Lix) to 718(Lxii) below). In order to calculate the risk, commodity derivatives should be converted into notional commodities positions and assigned to maturities as follows:

- *Futures and forward contracts relating to individual commodities* should be incorporated in the measurement system as notional amounts of barrels, kilos etc. and should be assigned a maturity with reference to expiry date;
- *Commodity swaps* where one leg is a fixed price and the other the current market price should be incorporated as a series of positions equal to the notional amount of the contract, with one position corresponding with each payment on the swap and slotted into the maturity ladder accordingly. The positions would be long positions if

¹⁴⁵ For banks using other approaches to measure options risk, all options and the associated underlyings should be excluded from both the maturity ladder approach and the simplified approach.

the bank is paying fixed and receiving floating, and short positions if the bank is receiving fixed and paying floating;¹⁴⁶

- *Commodity swaps* where the legs are in different commodities are to be incorporated in the relevant maturity ladder. No offsetting will be allowed in this regard except where the commodities belong to the same sub-category as defined in paragraph 718(xLvii) above.

(iii) *Simplified approach*

718(Liv). In calculating the capital charge for directional risk, the same procedure will be adopted as in the maturity ladder approach above (see paragraphs 718(xLix) and 718(Liii)). Once again, all commodity derivatives and off-balance-sheet positions which are affected by changes in commodity prices should be included. The capital charge will equal 15% of the net position, long or short, in each commodity.

718(Lv). In order to protect the bank against basis risk, interest rate risk and forward gap risk, the capital charge for each commodity as described in paragraphs 718(xLix) and 718(Liii) above will be subject to an additional capital charge equivalent to 3% of the bank's gross positions, long plus short, in that particular commodity. In valuing the gross positions in commodity derivatives for this purpose, banks should use the current spot price.

5. *Treatment of options*

718(Lvi). In recognition of the wide diversity of banks' activities in options and the difficulties of measuring price risk for options, several alternative approaches will be permissible at the discretion of the national authority:

- Those banks which solely use purchased options¹⁴⁷ will be free to use the simplified approach described in paragraph 718(Lviii) below;
- Those banks which also write options will be expected to use one of the intermediate approaches as set out in paragraphs 718(Lix) to 718(Lxix) or a comprehensive risk management model under the terms of paragraphs 718(Lxx) to 718(xcix) of this Framework. The more significant its trading, the more the bank will be expected to use a sophisticated approach.

718(Lvii). In the *simplified approach*, the positions for the options and the associated underlying, cash or forward, are not subject to the standardised methodology but rather are "carved-out" and subject to separately calculated capital charges that incorporate both general market risk and specific risk. The risk numbers thus generated are then added to the capital charges for the relevant category, i.e. interest rate related instruments, equities, foreign exchange and commodities as described in paragraphs 709 to 718(Lv). The *delta-plus method* uses the sensitivity parameters or "Greek letters" associated with options to measure their market risk and capital requirements. Under this method, the delta-equivalent position of each option becomes part of the standardised methodology set out in paragraphs 709 to 718(Lv) with the delta-equivalent amount subject to the applicable general market risk

¹⁴⁶ If one of the legs involves receiving/paying a fixed or floating interest rate, that exposure should be slotted into the appropriate repricing maturity band in the maturity ladder covering interest rate related instruments.

¹⁴⁷ Unless all their written option positions are hedged by perfectly matched long positions in exactly the same options, in which case no capital charge for market risk is required.

charges. Separate capital charges are then applied to the gamma and vega risks of the option positions. The *scenario approach* uses simulation techniques to calculate changes in the value of an options portfolio for changes in the level and volatility of its associated underlyings. Under this approach, the general market risk charge is determined by the scenario “grid” (i.e. the specified combination of underlying and volatility changes) that produces the largest loss. For the delta-plus method and the scenario approach the specific risk capital charges are determined separately by multiplying the delta-equivalent of each option by the specific risk weights set out in paragraphs 709 to 718(xxix).

(i) *Simplified approach*

718(Lviii). Banks which handle a limited range of purchased options only will be free to use the simplified approach set out in the table below for particular trades. As an example of how the calculation would work, if a holder of 100 shares currently valued at \$10 each holds an equivalent put option with a strike price of \$11, the capital charge would be: \$1,000 x 16% (i.e. 8% specific plus 8% general market risk) = \$160, less the amount the option is in the money (\$11 - \$10) x 100 = \$100, i.e. the capital charge would be \$60. A similar methodology applies for options whose underlying is a foreign currency, an interest rate related instrument or a commodity.

Simplified approach: capital charges

Position	Treatment
Long cash and Long put or Short cash and Long call	The capital charge will be the market value of the underlying security ¹⁴⁸ multiplied by the sum of specific and general market risk charges ¹⁴⁹ for the underlying less the amount the option is in the money (if any) bounded at zero ¹⁵⁰
Long call or Long put	The capital charge will be the lesser of: (i) the market value of the underlying security multiplied by the sum of specific and general market risk charges ¹⁴⁹ for the underlying (ii) the market value of the option ¹⁵¹

¹⁴⁸ In some cases such as foreign exchange, it may be unclear which side is the “underlying security”; this should be taken to be the asset which would be received if the option were exercised. In addition the nominal value should be used for items where the market value of the underlying instrument could be zero, e.g. caps and floors, swaptions etc.

¹⁴⁹ Some options (e.g. where the underlying is an interest rate, a currency or a commodity) bear no specific risk but specific risk will be present in the case of options on certain interest rate related instruments (e.g. options on a corporate debt security or corporate bond index; see paragraphs 709 to 718(xviii) for the relevant capital charges) and for options on equities and stock indices (see paragraphs 718(xix) to 718(xxix)). The charge under this measure for currency options will be 8% and for options on commodities 15%.

¹⁵⁰ For options with a residual maturity of more than six months the strike price should be compared with the forward, not current, price. A bank unable to do this must take the in the money amount to be zero.

¹⁵¹ Where the position does not fall within the trading book (i.e. options on certain foreign exchange or commodities positions not belonging to the trading book), it may be acceptable to use the book value instead.

(ii) *Intermediate approaches*

Delta-plus method

718(Lix). Banks which write options will be allowed to include delta-weighted options positions within the standardised methodology set out in paragraphs 709 to 718(LV). Such options should be reported as a position equal to the market value of the underlying multiplied by the delta. However, since delta does not sufficiently cover the risks associated with options positions, banks will also be required to measure gamma (which measures the rate of change of delta) and vega (which measures the sensitivity of the value of an option with respect to a change in volatility) sensitivities in order to calculate the total capital charge. These sensitivities will be calculated according to an approved exchange model or to the bank's proprietary options pricing model subject to oversight by the national authority.¹⁵²

718(LX). Delta-weighted positions with *debt securities or interest rates as the underlying* will be slotted into the interest rate time-bands, as set out in paragraphs 709 to 718(xviii), under the following procedure. A two-legged approach should be used as for other derivatives, requiring one entry at the time the underlying contract takes effect and a second at the time the underlying contract matures. For instance, a bought call option on a June three-month interest-rate future will in April be considered, on the basis of its delta-equivalent value, to be a long position with a maturity of five months and a short position with a maturity of two months.¹⁵³ The written option will be similarly slotted as a long position with a maturity of two months and a short position with a maturity of five months. Floating rate instruments with caps or floors will be treated as a combination of floating rate securities and a series of European-style options. For example, the holder of a three-year floating rate bond indexed to six month LIBOR with a cap of 15% will treat it as:

- (i) A debt security that reprices in six months; and
- (ii) A series of five written call options on a FRA with a reference rate of 15%, each with a negative sign at the time the underlying FRA takes effect and a positive sign at the time the underlying FRA matures.¹⁵⁴

718(Lxi). The capital charge for *options with equities as the underlying* will also be based on the delta-weighted positions which will be incorporated in the measure of market risk described in paragraphs 718(xix) to 718(xxix). For purposes of this calculation each national market is to be treated as a separate underlying. The capital charge for *options on foreign exchange and gold positions* will be based on the method set out in paragraphs 718(xxx) to 718(xLii). For delta risk, the net delta-based equivalent of the foreign currency and gold options will be incorporated into the measurement of the exposure for the respective currency (or gold) position. The capital charge for *options on commodities* will be based on the simplified or the maturity ladder approach set out in paragraphs 718(xLiii) to 718(LV). The delta-weighted positions will be incorporated in one of the measures described in that section.

¹⁵² National authorities may wish to require banks doing business in certain classes of exotic options (e.g. barriers, digitals) or in options at the money that are close to expiry to use either the scenario approach or the internal models alternative, both of which can accommodate more detailed revaluation approaches.

¹⁵³ A two months call option on a bond future where delivery of the bond takes place in September would be considered in April as being long the bond and short a five months deposit, both positions being delta-weighted.

¹⁵⁴ The rules applying to closely matched positions set out in paragraph 718(xiv) will also apply in this respect.

718(LXii). In addition to the above capital charges arising from delta risk, there will be further capital charges for *gamma* and for *vega risk*. Banks using the delta-plus method will be required to calculate the gamma and vega for each option position (including hedge positions) separately. The capital charges should be calculated in the following way:

- (i) for **each individual option** a “gamma impact” should be calculated according to a Taylor series expansion as:

$$\text{Gamma impact} = \frac{1}{2} \times \text{Gamma} \times \text{VU}^2$$

where VU = Variation of the underlying of the option.

- (ii) VU will be calculated as follows:

- For interest rate options if the underlying is a bond, the market value of the underlying should be multiplied by the risk weights set out in paragraph 718(iv). An equivalent calculation should be carried out where the underlying is an interest rate, again based on the assumed changes in the corresponding yield in paragraph 718(iv);
- For options on equities and equity indices: the market value of the underlying should be multiplied by 8%;¹⁵⁵
- For foreign exchange and gold options: the market value of the underlying should be multiplied by 8%;
- For options on commodities: the market value of the underlying should be multiplied by 15%.

- (iii) For the purpose of this calculation the following positions should be treated as **the same underlying**:

- for interest rates,¹⁵⁶ each time-band as set out in paragraph 718(iv);¹⁵⁷
- for equities and stock indices, each national market;
- for foreign currencies and gold, each currency pair and gold;
- for commodities, each individual commodity as defined in paragraph 718(xLVii).

- (iv) Each option on the same underlying will have a gamma impact that is either positive or negative. These individual gamma impacts will be summed, resulting in a net gamma impact for each underlying that is either positive or negative. Only those net gamma impacts that are negative will be included in the capital calculation.

¹⁵⁵ The basic rules set out here for interest rate and equity options do not attempt to capture specific risk when calculating gamma capital charges. However, national authorities may wish to require specific banks to do so.

¹⁵⁶ Positions have to be slotted into separate maturity ladders by currency.

¹⁵⁷ Banks using the duration method should use the time-bands as set out in paragraph 718(vii).

- (v) The total gamma capital charge will be the sum of the absolute value of the net negative gamma impacts as calculated above.
- (vi) For **volatility risk**, banks will be required to calculate the capital charges by multiplying the sum of the vegas for all options on the same underlying, as defined above, by a proportional shift in volatility of $\pm 25\%$.
- (vii) The **total capital charge** for vega risk will be the sum of the absolute value of the individual capital charges that have been calculated for vega risk.

Scenario approach

718(LXiii). More sophisticated banks will also have the right to base the market risk capital charge for options portfolios and associated hedging positions on *scenario matrix analysis*. This will be accomplished by specifying a fixed range of changes in the option portfolio's risk factors and calculating changes in the value of the option portfolio at various points along this "grid". For the purpose of calculating the capital charge, the bank will revalue the option portfolio using matrices for simultaneous changes in the option's underlying rate or price and in the volatility of that rate or price. A different matrix will be set up for each individual underlying as defined in paragraph 718(LXii) above. As an alternative, at the discretion of each national authority, banks which are significant traders in options will for interest rate options be permitted to base the calculation on a minimum of six sets of time-bands. When using this method, not more than three of the time-bands as defined in paragraphs 718(iv) and 718(vii) should be combined into any one set.

718(LXiv). The options and related hedging positions will be evaluated over a specified range above and below the current value of the underlying. The range for interest rates is consistent with the assumed changes in yield in paragraph 718(iv). Those banks using the alternative method for interest rate options set out in paragraph 718(LXiii) above should use, for each set of time-bands, the highest of the assumed changes in yield applicable to the group to which the time-bands belong.¹⁵⁸ The other ranges are $\pm 8\%$ for equities¹⁵⁵, $\pm 8\%$ for foreign exchange and gold, and $\pm 15\%$ for commodities. For all risk categories, at least seven observations (including the current observation) should be used to divide the range into equally spaced intervals.

718(LXv). The second dimension of the matrix entails a change in the volatility of the underlying rate or price. A single change in the volatility of the underlying rate or price equal to a shift in volatility of $+ 25\%$ and $- 25\%$ is expected to be sufficient in most cases. As circumstances warrant, however, the supervisory authority may choose to require that a different change in volatility be used and/or that intermediate points on the grid be calculated.

718(LXvi). After calculating the matrix each cell contains the net profit or loss of the option and the underlying hedge instrument. The capital charge for each underlying will then be calculated as the largest loss contained in the matrix.

718(LXvii). The application of the scenario analysis by any specific bank will be subject to supervisory consent, particularly as regards the precise way that the analysis is constructed. Banks' use of scenario analysis as part of the standardised methodology will also be subject to validation by the national authority, and to those of the qualitative standards listed in paragraphs 718(LXXiv) and 718(LXXv) which are appropriate given the nature of the business.

¹⁵⁸ If, for example, the time-bands 3 to 4 years, 4 to 5 years and 5 to 7 years are combined the highest assumed change in yield of these three bands would be 0.75.

718(LXviii). In drawing up these intermediate approaches the Committee has sought to cover the major risks associated with options. In doing so, it is conscious that so far as specific risk is concerned, only the delta-related elements are captured; to capture other risks would necessitate a much more complex regime. On the other hand, in other areas the simplifying assumptions used have resulted in a relatively conservative treatment of certain options positions. For these reasons, the Committee intends to keep this area under close review.

718(LXix). Besides the options risks mentioned above, the Committee is conscious of the other risks also associated with options, e.g. rho (rate of change of the value of the option with respect to the interest rate) and theta (rate of change of the value of the option with respect to time). While not proposing a measurement system for those risks at present, it expects banks undertaking significant options business at the very least to monitor such risks closely. Additionally, banks will be permitted to incorporate rho into their capital calculations for interest rate risk, if they wish to do so.

D. Market Risk – The Internal Models Approach

1. General criteria

718(LXX). The use of an internal model will be conditional upon the explicit approval of the bank's supervisory authority. Home and host country supervisory authorities of banks that carry out material trading activities in multiple jurisdictions intend to work co-operatively to ensure an efficient approval process.

718(LXXi). The supervisory authority will only give its approval if at a minimum:

- It is satisfied that the bank's risk management system is conceptually sound and is implemented with integrity;
- The bank has in the supervisory authority's view sufficient numbers of staff skilled in the use of sophisticated models not only in the trading area but also in the risk control, audit, and if necessary, back office areas;
- The bank's models have in the supervisory authority's judgement a proven track record of reasonable accuracy in measuring risk;
- The bank regularly conducts stress tests along the lines discussed in paragraphs 718(LXXvii) to 718(LXXXiv) below.

718(LXXii). Supervisory authorities will have the right to insist on a period of initial monitoring and live testing of a bank's internal model before it is used for supervisory capital purposes.

718(LXXiii). In addition to these general criteria, banks using internal models for capital purposes will be subject to the requirements detailed in paragraphs 718(LXXiv) to 718(xcix).

2. Qualitative standards

718(LXXiv). It is important that supervisory authorities are able to assure themselves that banks using models have market risk management systems that are conceptually sound and implemented with integrity. Accordingly, the supervisory authority will specify a number of *qualitative criteria* that banks would have to meet before they are permitted to use a models-based approach. The extent to which banks meet the qualitative criteria may influence the level at which supervisory authorities will set the multiplication factor referred to in paragraph 718(LXXvi) (j) below. Only those banks whose models are in full compliance with the

qualitative criteria will be eligible for application of the minimum multiplication factor. The qualitative criteria include:

- (a) The bank should have an independent risk control unit that is responsible for the design and implementation of the bank's risk management system. The unit should produce and analyse daily reports on the output of the bank's risk measurement model, including an evaluation of the relationship between measures of risk exposure and trading limits. This unit must be independent from business trading units and should report directly to senior management of the bank.
- (b) The unit should conduct a regular back-testing programme, i.e. an ex-post comparison of the risk measure generated by the model against actual daily changes in portfolio value over longer periods of time, as well as hypothetical changes based on static positions.
- (c) The unit should also conduct the initial and on-going validation of the internal model.¹⁵⁹
- (d) Board of directors and senior management should be actively involved in the risk control process and must regard risk control as an essential aspect of the business to which significant resources need to be devoted.¹⁶⁰ In this regard, the daily reports prepared by the independent risk control unit must be reviewed by a level of management with sufficient seniority and authority to enforce both reductions of positions taken by individual traders and reductions in the bank's overall risk exposure.
- (e) The bank's internal risk measurement model must be closely integrated into the day-to-day risk management process of the bank. Its output should accordingly be an integral part of the process of planning, monitoring and controlling the bank's market risk profile.
- (f) The risk measurement system should be used in conjunction with internal trading and exposure limits. In this regard, trading limits should be related to the bank's risk measurement model in a manner that is consistent over time and that is well-understood by both traders and senior management.
- (g) A routine and rigorous programme of stress testing¹⁶¹ should be in place as a supplement to the risk analysis based on the day-to-day output of the bank's risk measurement model. The results of stress testing should be reviewed periodically by senior management, used in the internal assessment of capital adequacy, and reflected in the policies and limits set by management and the board of directors. Where stress tests reveal particular vulnerability to a given set of circumstances, prompt steps should be taken to manage those risks appropriately (e.g. by hedging against that outcome or reducing the size of the bank's exposures, or increasing capital).

¹⁵⁹ Further guidance regarding the standards that supervisory authorities will expect can be found in paragraph 718(xcix).

¹⁶⁰ The report, *Risk management guidelines for derivatives*, issued by the Basel Committee in July 1994 further discusses the responsibilities of the board of directors and senior management.

¹⁶¹ Though banks will have some discretion as to how they conduct stress tests, their supervisory authorities will wish to see that they follow the general lines set out in paragraphs 718(Lxxvii) to 718(Lxxxiii).

- (h) Banks should have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operation of the risk measurement system. The bank's risk measurement system must be well documented, for example, through a risk management manual that describes the basic principles of the risk management system and that provides an explanation of the empirical techniques used to measure market risk.
- (i) An independent review of the risk measurement system should be carried out regularly in the bank's own internal auditing process. This review should include both the activities of the business trading units and of the independent risk control unit. A review of the overall risk management process should take place at regular intervals (ideally not less than once a year) and should specifically address, at a minimum:
- The adequacy of the documentation of the risk management system and process;
 - The organisation of the risk control unit;
 - The integration of market risk measures into daily risk management;
 - The approval process for risk pricing models and valuation systems used by front and back-office personnel;
 - The validation of any significant change in the risk measurement process;
 - The scope of market risks captured by the risk measurement model;
 - The integrity of the management information system;
 - The accuracy and completeness of position data;
 - The verification of the consistency, timeliness and reliability of data sources used to run internal models, including the independence of such data sources;
 - The accuracy and appropriateness of volatility and correlation assumptions;
 - The accuracy of valuation and risk transformation calculations;
 - The verification of the model's accuracy through frequent back-testing as described in 718(LXXIV) (b) above and in the accompanying document: *Supervisory framework for the use of backtesting in conjunction with the internal models approach to market risk capital requirements.*

3. Specification of market risk factors

718(LXXV). An important part of a bank's internal market risk measurement system is the specification of an appropriate set of market risk factors, i.e. the market rates and prices that affect the value of the bank's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in the bank's portfolio of on- and off-balance sheet trading positions. Although banks will have some discretion in specifying the risk factors for their internal models, the following guidelines should be fulfilled.

- (a) For *interest rates*, there must be a set of risk factors corresponding to interest rates in each currency in which the bank has interest-rate-sensitive on- or off-balance sheet positions.
- The risk measurement system should model the yield curve using one of a number of generally accepted approaches, for example, by estimating forward rates of zero coupon yields. The yield curve should be divided into various maturity segments in order to capture variation in the volatility of rates along the yield curve; there will typically be one risk factor corresponding to each maturity segment. For material exposures to interest rate movements in the major currencies and markets, banks must model the yield curve using a minimum of six risk factors. However, the number of risk factors used should ultimately be driven by the nature of the bank's trading strategies. For instance, a bank with a portfolio of various types of securities across many points of the yield curve and that engages in complex arbitrage strategies would require a greater number of risk factors to capture interest rate risk accurately.
 - The risk measurement system must incorporate separate risk factors to capture spread risk (e.g. between bonds and swaps). A variety of approaches may be used to capture the spread risk arising from less than perfectly correlated movements between government and other fixed-income interest rates, such as specifying a completely separate yield curve for non-government fixed-income instruments (for instance, swaps or municipal securities) or estimating the spread over government rates at various points along the yield curve.
- (b) For *exchange rates* (which may include gold), the risk measurement system should incorporate risk factors corresponding to the individual foreign currencies in which the bank's positions are denominated. Since the value-at-risk figure calculated by the risk measurement system will be expressed in the bank's domestic currency, any net position denominated in a foreign currency will introduce a foreign exchange risk. Thus, there must be risk factors corresponding to the exchange rate between the domestic currency and each foreign currency in which the bank has a significant exposure.
- (c) For *equity prices*, there should be risk factors corresponding to each of the equity markets in which the bank holds significant positions:
- At a minimum, there should be a risk factor that is designed to capture market-wide movements in equity prices (e.g. a market index). Positions in individual securities or in sector indices could be expressed in "beta-equivalents"¹⁶² relative to this market-wide index;
 - A somewhat more detailed approach would be to have risk factors corresponding to various sectors of the overall equity market (for instance, industry sectors or cyclical and non-cyclical sectors). As above, positions in

¹⁶² A "beta-equivalent" position would be calculated from a market model of equity price returns (such as the CAPM model) by regressing the return on the individual stock or sector index on the risk-free rate of return and the return on the market index.

individual stocks within each sector could be expressed in beta-equivalents⁴⁹ relative to the sector index;

- The most extensive approach would be to have risk factors corresponding to the volatility of individual equity issues.
 - The sophistication and nature of the modelling technique for a given market should correspond to the bank's exposure to the overall market as well as its concentration in individual equity issues in that market.
- (d) For *commodity prices*, there should be risk factors corresponding to each of the commodity markets in which the bank holds significant positions (also see paragraph 718(xLvii) above):
- For banks with relatively limited positions in commodity-based instruments, a straightforward specification of risk factors would be acceptable. Such a specification would likely entail one risk factor for each commodity price to which the bank is exposed. In cases where the aggregate positions are quite small, it might be acceptable to use a single risk factor for a relatively broad sub-category of commodities (for instance, a single risk factor for all types of oil);
 - For more active trading, the model must also take account of variation in the "convenience yield"¹⁶³ between derivatives positions such as forwards and swaps and cash positions in the commodity.

4. Quantitative standards

718(Lxxvi). Banks will have flexibility in devising the precise nature of their models, but the following minimum standards will apply for the purpose of calculating their capital charge. Individual banks or their supervisory authorities will have discretion to apply stricter standards.

- (a) "Value-at-risk" must be computed on a daily basis.
- (b) In calculating the value-at-risk, a 99th percentile, one-tailed *confidence interval* is to be used.
- (c) In calculating value-at-risk, an instantaneous price shock equivalent to a 10 day movement in prices is to be used, i.e. the minimum "*holding period*" will be ten trading days. Banks may use value-at-risk numbers calculated according to shorter holding periods scaled up to ten days by the square root of time (for the treatment of options, also see 718(Lxxvi) (h) below).
- (d) The choice of *historical observation period* (sample period) for calculating value-at-risk will be constrained to a minimum length of one year. For banks that use a weighting scheme or other methods for the historical observation period, the

¹⁶³ The convenience yield reflects the benefits from direct ownership of the physical commodity (for example, the ability to profit from temporary market shortages), and is affected both by market conditions and by factors such as physical storage costs.

“effective” observation period must be at least one year (that is, the weighted average time lag of the individual observations cannot be less than 6 months).

- (e) Banks should update their *data sets* no less frequently than once every three months and should also reassess them whenever market prices are subject to material changes. The supervisory authority may also require a bank to calculate its value-at-risk using a shorter observation period if, in the supervisor’s judgement, this is justified by a significant upsurge in price volatility.
- (f) No particular *type of model* is prescribed. So long as each model used captures all the material risks run by the bank, as set out in paragraph 718(Lxxv), banks will be free to use models based, for example, on variance-covariance matrices, historical simulations, or Monte Carlo simulations.
- (g) Banks will have discretion to recognise empirical *correlations* within broad risk categories (e.g. interest rates, exchange rates, equity prices and commodity prices, including related options volatilities in each risk factor category). The supervisory authority may also recognise empirical correlations across broad risk factor categories, provided that the supervisory authority is satisfied that the bank’s system for measuring correlations is sound and implemented with integrity.
- (h) Banks’ models must accurately capture the unique risks associated with *options* within each of the broad risk categories. The following criteria apply to the measurement of options risk:
 - Banks’ models must capture the *non-linear price characteristics* of options positions;
 - Banks are expected to ultimately move towards the application of a full 10 day price shock to options positions or positions that display option-like characteristics. In the interim, national authorities may require banks to adjust their capital measure for options risk through other methods, e.g. periodic simulations or stress testing;
 - Each bank’s risk measurement system must have a set of risk factors that captures the *volatilities of the rates and prices* underlying option positions, i.e. vega risk. Banks with relatively large and/or complex options portfolios should have detailed specifications of the relevant volatilities. This means that banks should measure the volatilities of options positions broken down by different maturities.
- (i) Each bank must meet, on a daily basis, a *capital requirement* expressed as the higher of (i) its previous day’s value-at-risk number measured according to the parameters specified in this section and (ii) an average of the daily value-at-risk measures on each of the preceding sixty business days, multiplied by a multiplication factor.
- (j) The multiplication factor will be set by individual supervisory authorities on the basis of their assessment of the quality of the bank’s risk management system, subject to an absolute minimum of 3. Banks will be required to add to this factor a “plus” directly related to the ex-post performance of the model, thereby introducing a built-in positive incentive to maintain the predictive quality of the model. The plus will range from 0 to 1 based on the outcome of so-called “backtesting.” If the backtesting results are satisfactory and the bank meets all of the qualitative standards set out in paragraph 718(Lxxiv) above, the plus factor could be zero. The Annex 10a of this

Framework presents in detail the approach to be applied for backtesting and the plus factor. Supervisors will have national discretion to require banks to perform backtesting on either hypothetical (i.e. using changes in portfolio value that would occur were end-of-day positions to remain unchanged), or actual trading (i.e. excluding fees, commissions, and net interest income) outcomes, or both.

- (k) Banks using models will also be subject to a capital charge to cover *specific risk* (as defined under the standardised approach for market risk) of interest rate related instruments and equity securities. The manner in which the specific risk capital charge is to be calculated is set out in paragraphs 718(Lxxxvii) to 718(xcviii).

5. Stress testing

718(Lxxvii). Banks that use the internal models approach for meeting market risk capital requirements must have in place a rigorous and comprehensive stress testing program. Stress testing to identify events or influences that could greatly impact banks is a key component of a bank's assessment of its capital position.

718(Lxxviii). Banks' stress scenarios need to cover a range of factors that can create extraordinary losses or gains in trading portfolios, or make the control of risk in those portfolios very difficult. These factors include low-probability events in all major types of risks, including the various components of market, credit, and operational risks. Stress scenarios need to shed light on the impact of such events on positions that display both linear and non-linear price characteristics (i.e. options and instruments that have options-like characteristics).

718(Lxxix). Banks' stress tests should be both of a quantitative and qualitative nature, incorporating both market risk and liquidity aspects of market disturbances. Quantitative criteria should identify plausible stress scenarios to which banks could be exposed. Qualitative criteria should emphasise that two major goals of stress testing are to evaluate the capacity of the bank's capital to absorb potential large losses and to identify steps the bank can take to reduce its risk and conserve capital. This assessment is integral to setting and evaluating the bank's management strategy and the results of stress testing should be routinely communicated to senior management and, periodically, to the bank's board of directors.

718(Lxxx). Banks should combine the use of supervisory stress scenarios with stress tests developed by banks themselves to reflect their specific risk characteristics. Specifically, supervisory authorities may ask banks to provide information on stress testing in three broad areas, which are discussed in turn below.

(i) Supervisory scenarios requiring no simulations by the bank

718(Lxxxii). Banks should have information on the largest losses experienced during the reporting period available for supervisory review. This loss information could be compared to the level of capital that results from a bank's internal measurement system. For example, it could provide supervisory authorities with a picture of how many days of peak day losses would have been covered by a given value-at-risk estimate.

(ii) Scenarios requiring a simulation by the bank

718(Lxxxii). Banks should subject their portfolios to a series of simulated stress scenarios and provide supervisory authorities with the results. These scenarios could include testing the current portfolio against past periods of significant disturbance, for example, the 1987 equity crash, the ERM crises of 1992 and 1993 or the fall in bond markets in the first quarter

of 1994, incorporating both the large price movements and the sharp reduction in liquidity associated with these events. A second type of scenario would evaluate the sensitivity of the bank's market risk exposure to changes in the assumptions about volatilities and correlations. Applying this test would require an evaluation of the historical range of variation for volatilities and correlations and evaluation of the bank's current positions against the extreme values of the historical range. Due consideration should be given to the sharp variation that at times has occurred in a matter of days in periods of significant market disturbance. The 1987 equity crash, the suspension of the ERM, or the fall in bond markets in the first quarter of 1994, for example, all involved correlations within risk factors approaching the extreme values of 1 or -1 for several days at the height of the disturbance.

(iii) *Scenarios developed by the bank itself to capture the specific characteristics of its portfolio.*

718(Lxxxiii). In addition to the scenarios prescribed by supervisory authorities under paragraphs 718(Lxxxi) and 718(Lxxxii) above, a bank should also develop its own stress tests which it identifies as most adverse based on the characteristics of its portfolio (e.g. problems in a key region of the world combined with a sharp move in oil prices). Banks should provide supervisory authorities with a description of the methodology used to identify and carry out the scenarios as well as with a description of the results derived from these scenarios.

718(Lxxxiv). The results should be reviewed periodically by senior management and should be reflected in the policies and limits set by management and the board of directors. Moreover, if the testing reveals particular vulnerability to a given set of circumstances, the national authorities would expect the bank to take prompt steps to manage those risks appropriately (e.g. by hedging against that outcome or reducing the size of its exposures).

6. External validation

718(Lxxxv). The validation of models' accuracy by external auditors and/or supervisory authorities should at a minimum include the following steps:

- (a) Verifying that the *internal validation processes* described in paragraph 718(Lxxiv) (i) are operating in a satisfactory manner;
- (b) Ensuring that the *formulae* used in the calculation process as well as for the pricing of options and other complex instruments are validated by a qualified unit, which in all cases should be independent from the trading area;
- (c) Checking that the *structure* of internal models is adequate with respect to the bank's activities and geographical coverage;
- (d) Checking the results of the banks' *back-testing* of its internal measurement system (i.e. comparing value-at-risk estimates with actual profits and losses) to ensure that the model provides a reliable measure of potential losses over time. This means that banks should make the results as well as the underlying inputs to their value-at-risk calculations available to their supervisory authorities and/or external auditors on request;
- (e) Making sure that data flows and processes associated with the risk measurement system are *transparent and accessible*. In particular, it is necessary that auditors or supervisory authorities are in a position to have easy access, whenever they judge it necessary and under appropriate procedures, to the models' specifications and parameters.

7. Combination of internal models and the standardised methodology

718(Lxxxvi). Unless a bank's exposure to a particular risk factor, such as commodity prices, is insignificant, the internal models approach will in principle require banks to have an integrated risk measurement system that captures the broad risk factor categories (i.e. interest rates, exchange rates (which may include gold), equity prices and commodity prices, with related options volatilities being included in each risk factor category). Thus, banks which start to use models for one or more risk factor categories will, over time, be expected to extend the models to all their market risks. A bank which has developed one or more models will no longer be able to revert to measuring the risk measured by those models according to the standardised methodology (unless the supervisory authority withdraws approval for that model). However, pending further experience regarding the process of changing to a models-based approach, no specific time limit will be set for banks which use a combination of internal models and the standardised methodology to move to a comprehensive model. The following conditions will apply to banks using such combinations:

- (a) Each broad risk factor category must be assessed using a single approach (either internal models or the standardised approach), i.e. no combination of the two methods will in principle be permitted within a risk category or across banks' different entities for the same type of risk (but see paragraph 708(i) above);¹⁶⁴
- (b) All the criteria laid down in paragraphs 718(Lxx) to 718(xcix) of this Framework will apply to the models being used;
- (c) Banks may not modify the combination of the two approaches they use without justifying to their supervisory authority that they have a good reason for doing so;
- (d) No element of market risk may escape measurement, i.e. the exposure for all the various risk factors, whether calculated according to the standardised approach or internal models, would have to be captured;
- (e) The capital charges assessed under the standardised approach and under the models approach are to be aggregated according to the simple sum method.

8. Treatment of specific risk

718(Lxxxvii). Where a bank has a VaR measure that incorporates specific risk and that meets all the qualitative and quantitative requirements for general risk models, it may base its charge on modelled estimates, provided the measure is based on models that meet the additional criteria and requirements set out below. Banks which are unable to meet these additional criteria and requirements will be required to base their specific risk capital charge on the full amount of the specific risk charge calculated under the standardised method.

718(Lxxxviii). The criteria for supervisory recognition of banks' modelling of specific risk require that a bank's model must capture all material components of price risk and be responsive to changes in market conditions and compositions of portfolios. In particular, the model must:

¹⁶⁴ However, banks may incur risks in positions which are not captured by their models, for example, in remote locations, in minor currencies or in negligible business areas. Such risks should be measured according to the standardised methodology.

- explain the historical price variation in the portfolio;¹⁶⁵
- capture concentrations (magnitude and changes in composition);¹⁶⁶
- be robust to an adverse environment;¹⁶⁷
- capture name-related basis risk;¹⁶⁸
- capture event risk;¹⁶⁹
- be validated through backtesting.¹⁷⁰

718(Lxxxix). Where a bank is subject to event risk that is not reflected in its VaR measure, because it is beyond the 10-day holding period and 99 percent confidence interval (i.e. low probability and high severity events), banks must ensure that the impact of such events is factored in to its internal capital assessment, for example through its stress testing.

718(xc). The bank's model must conservatively assess the risk arising from less liquid positions and/or positions with limited price transparency under realistic market scenarios. In addition, the model must meet minimum data standards. Proxies may be used only where available data is insufficient or is not reflective of the true volatility of a position or portfolio, and only where they are appropriately conservative.

718(xci). Further, as techniques and best practices evolve, banks should avail themselves of these advances.

718(xcii). In addition, the bank must have an approach in place to capture in its regulatory capital default risk of its trading book positions that is incremental to the risk captured by the VaR-based calculation as specified in paragraph 718(Lxxxviii) above. To avoid double counting a bank may, when calculating its incremental default charge, take into account the

¹⁶⁵ The key ex ante measures of model quality are "goodness-of-fit" measures which address the question of how much of the historical variation in price value is explained by the risk factors included within the model. One measure of this type which can often be used is an R-squared measure from regression methodology. If this measure is to be used, the risk factors included in the bank's model would be expected to be able to explain a high percentage, such as 90%, of the historical price variation or the model should explicitly include estimates of the residual variability not captured in the factors included in this regression. For some types of models, it may not be feasible to calculate a goodness-of-fit measure. In such instance, a bank is expected to work with its national supervisor to define an acceptable alternative measure which would meet this regulatory objective.

¹⁶⁶ The bank would be expected to demonstrate that the model is sensitive to changes in portfolio construction and that higher capital charges are attracted for portfolios that have increasing concentrations in particular names or sectors.

¹⁶⁷ The bank should be able to demonstrate that the model will signal rising risk in an adverse environment. This could be achieved by incorporating in the historical estimation period of the model at least one full credit cycle and ensuring that the model would not have been inaccurate in the downward portion of the cycle. Another approach for demonstrating this is through simulation of historical or plausible worst-case environments.

¹⁶⁸ Banks should be able to demonstrate that the model is sensitive to material idiosyncratic differences between similar but not identical positions, for example debt positions with different levels of subordination, maturity mismatches, or credit derivatives with different default events.

¹⁶⁹ For debt positions, this should include migration risk. For equity positions, events that are reflected in large changes or jumps in prices must be captured, e.g. merger break-ups/takeovers. In particular, firms must consider issues related to survivorship bias.

¹⁷⁰ Aimed at assessing whether specific risk, as well as general market risk, is being captured adequately.

extent to which default risk has already been incorporated into the VaR calculation, especially for risk positions that could and would be closed within 10 days in the event of adverse market conditions or other indications of deterioration in the credit environment. No specific approach for capturing the incremental default risk is prescribed; it may be part of the bank's internal model or a surcharge from a separate calculation. Where a bank captures its incremental risk through a surcharge, the surcharge will not be subject to a multiplier or regulatory backtesting, although the bank should be able to demonstrate that the surcharge meets its aim.

718(xciii). Whichever approach is used, the bank must demonstrate that it meets a soundness standard comparable to that of the internal-ratings based approach for credit risk as set forth in this Framework, under the assumption of a constant level of risk, and adjusted where appropriate to reflect the impact of liquidity, concentrations, hedging, and optionality. A bank that does not capture the incremental default risk through an internally developed approach must use the fallback of calculating the surcharge through an approach consistent with that for credit risk as set forth in this Framework.

718(xciv). Whichever approach is used, cash or synthetic exposures that would be subject to a deduction treatment under the securitisation framework set forth in this Framework (e.g. equity tranches that absorb first losses),¹⁷¹ as well as securitisation exposures that are unrated liquidity lines or letters of credit, would be subject to a capital charge that is no less than that set forth in the securitisation framework.

718(xcv). An exception to this treatment could be afforded to banks that are dealers in the above exposures where they can demonstrate, in addition to trading intent, that a liquid two-way market exists for the securitisation exposures or, in the case of synthetic securitisations that rely solely on credit derivatives, for the securitisation exposures themselves or all their constituent risk components. For purposes of this section, a two-way market is deemed to exist where there are independent bona fide offers to buy and sell so that a price reasonably related to the last sales price or current bona fide competitive bid and offer quotations can be determined within one day and settled at such price within a relatively short time conforming to trade custom. In addition, for a bank to apply this exception, it must have sufficient market data to ensure that it fully captures the concentrated default risk of these exposures in its internal approach for measuring the incremental default risk in accordance with the standards set forth above.

718(xcvi). Banks that already have received specific risk model recognition for particular portfolios or lines of business should agree a timetable with their supervisors to bring their model in line with the new standards in a timely manner as is practicable.

718(xcvii). Banks which apply modelled estimates of specific risk are required to conduct backtesting aimed at assessing whether specific risk is being accurately captured. The methodology a bank should use for validating its specific risk estimates is to perform separate backtests on sub-portfolios using daily data on sub-portfolios subject to specific risk. The key sub-portfolios for this purpose are traded-debt and equity positions. However, if a bank itself decomposes its trading portfolio into finer categories (e.g. emerging markets, traded corporate debt, etc.), it is appropriate to keep these distinctions for sub-portfolio backtesting purposes. Banks are required to commit to a sub-portfolio structure and stick to it

¹⁷¹ These include risk equivalent positions, e.g. inventories of credit exposures that the bank intends to sell through cash securitisations and for which it has in place tranching credit protections so that it retains an exposure that would be subject to deduction under the securitisation framework.

unless it can be demonstrated to the supervisor that it would make sense to change the structure.

718(xcviii). Banks are required to have in place a process to analyse exceptions identified through the backtesting of specific risk. This process is intended to serve as the fundamental way in which banks correct their models of specific risk in the event they become inaccurate. There will be a presumption that models that incorporate specific risk are “unacceptable” if the results at the sub-portfolio level produce a number of exceptions commensurate with the *Red Zone* as defined in Annex 10a of this Framework. Banks with “unacceptable” specific risk models are expected to take immediate action to correct the problem in the model and to ensure that there is a sufficient capital buffer to absorb the risk that the backtest showed had not been adequately captured.

9. Model validation standards

718(xcix). It is important that banks have processes in place to ensure that their internal models have been adequately validated by suitably qualified parties independent of the development process to ensure that they are conceptually sound and adequately capture all material risks. This validation should be conducted when the model is initially developed and when any significant changes are made to the model. The validation should also be conducted on a periodic basis but especially where there have been any significant structural changes in the market or changes to the composition of the portfolio which might lead to the model no longer being adequate. More extensive model validation is particularly important where specific risk is also modelled and is required to meet the further specific risk criteria. As techniques and best practices evolve, banks should avail themselves of these advances. Model validation should not be limited to backtesting, but should, at a minimum, also include the following:

- (a) Tests to demonstrate that any assumptions made within the internal model are appropriate and do not underestimate risk. This may include the assumption of the normal distribution, the use of the square root of time to scale from a one day holding period to a 10 day holding period or where extrapolation or interpolation techniques are used, or pricing models;
- (b) Further to the regulatory backtesting programmes, testing for model validation should be carried out using additional tests, which may include, for instance:
 - Testing carried out using hypothetical changes in portfolio value that would occur were end-of-day positions to remain unchanged. It therefore excludes fees, commissions, bid-ask spreads, net interest income and intra-day trading;
 - Testing carried out for longer periods than required for the regular backtesting programme (e.g. 3 years). The longer time period generally improves the power of the backtesting. A longer time period may not be desirable if the VaR model or market conditions have changed to the extent that historical data is no longer relevant;
 - Testing carried out using confidence intervals other than the 99 percent interval required under the quantitative standards;
 - Testing of portfolios below the overall bank level;
- (c) The use of hypothetical portfolios to ensure that the model is able to account for particular structural features that may arise, for example:

- Where data histories for a particular instrument do not meet the quantitative standards in paragraph 718(Lxxvi) and where the bank has to map these positions to proxies, then the bank must ensure that the proxies produce conservative results under relevant market scenarios;
- Ensuring that material basis risks are adequately captured. This may include mismatches between long and short positions by maturity or by issuer;
- Ensuring that the model captures concentration risk that may arise in an undiversified portfolio.