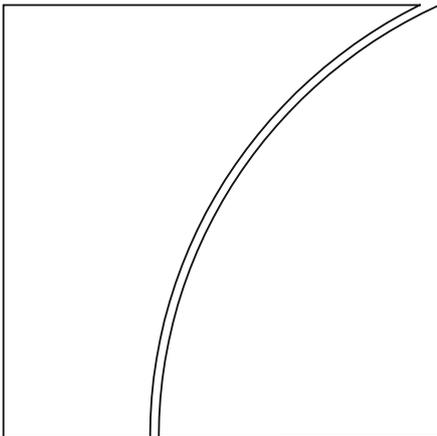


Basel Committee on Banking Supervision



Additional guidance for completing the IRB quantitative impact study

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BANK FOR INTERNATIONAL SETTLEMENTS

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Introduction

On 24 March 2016, the Basel Committee published its consultation document *Reducing variation in credit risk-weighted assets - constraints on the use of internal model approaches*. A quantitative impact study (QIS) was launched in April 2016 to collect data on the impact of the proposals.¹ As a supplement to the QIS reporting instructions, this document sets out the draft edits proposed at the working group level to the internal ratings-based (IRB) approach for credit risk to give effect to the proposals set out in the consultation document.

The draft edits set out in this document are intended to facilitate the completion of the QIS templates only. They are not to be construed as an official interpretation of the consultation document published by the Committee. Upon completing its review of the IRB approach, the Committee will publish a revised text for the standard.

Background information

The draft edits set out in this document relate to the IRB approach. Specifically, they cover edits to paragraphs 211 to 537 of the June 2006 comprehensive version of Basel II.² In considering these draft edits it is important to note the following:

- The IRB approach includes many cross-references to the standardised approach to credit risk. Therefore, the cross-references in this document have been updated to refer to the proposed version of the standardised approach to credit risk that was published for consultation in December 2015.³ To signal references to the proposed revised standardised approach, the cross-references in this document have been put in square brackets.
- There are certain proposed changes to the standardised approach that were noted in the March 2016 IRB consultation document that should be assumed to apply for the purposes of assessing the overall impact of the IRB proposals:
 - To give effect to the revised definition of “commitment” set out in section 4.3 of the IRB consultation document, the following text replaces the second sentence of paragraph [64]: *“For these purposes commitment means any contractual arrangement that has been offered by the bank and accepted by the client to extend credit, purchase assets or issue credit substitutes. It includes any such arrangement that can be unconditionally cancelled by the bank at any time without prior notice to the obligor. It also includes any such arrangement that can be cancelled by the bank if the obligor fails to meet conditions set out in the facility documentation, including conditions that must be met by the obligor prior to any initial or subsequent drawdown under the arrangement.”*

¹ Further information on the consultative document is available at www.bis.org/bcbs/publ/d362.htm and for more information on the quantitative impact assessment, see www.bis.org/bcbs/qis/index.htm

² See www.bis.org/publ/bcbs128.htm

³ See *Revisions to the Standardised Approach for credit risk - second consultative document*, www.bis.org/bcbs/publ/d347.htm

- Footnote 10 of the IRB consultation document states that the proposals to require the use of the standardised approach to calculate credit risk for exposures to certain counterparties, do not preclude the use of the internal model method (IMM) to estimate the exposures to these counterparties. This means that paragraph [119] of the standardised approach is only applicable if the bank does not use the IRB approach for any of its exposures. For banks that apply the IRB approach, the IMM set out in Annex 4 of the framework can be applied (subject to supervisory approval). Please note that Annex 4 is not reproduced in this document.
- Even though the IRB consultation document proposals do not apply to sovereign exposures, the reference to sovereign exposures remain embedded in the text of this document. These will be adjusted, if necessary, following the completion of the Basel Committee’s review of sovereign exposures, which is subject to an ongoing separate review. Any change to the treatment of sovereign exposures implied by this draft text should therefore be ignored.
- This document also includes edits to the IRB approach to give effect to changes that have been announced by the Basel Committee since the publication of the comprehensive version of Basel II, such as the changes introduced through Basel III. To distinguish the two sets of edits, the following formatting is used:
 - red underline font for proposed additional text to reflect the IRB consultation document proposals;
 - ~~red strikethrough~~ font for proposed text to be deleted to reflect the IRB consultation document proposals;
 - blue underline font and ~~blue strikethrough~~ font to highlight changes to the Basel II text that were introduced through Basel III and other subsequent changes to the standards.
 - **yellow highlighted** text to provide explanatory comments on certain issues.
- This document does not cover various agreed final standards including: (i) the standardised approach to counterparty credit risk; (ii) the treatment of counterparty credit risk set out in annex 4 of Basel II; (iii) the treatment of bank exposures to central counterparties; (iv) the treatment of banks investments in the equity of funds.

Edits to the IRB approach for QIS purposes

NB: References are shown [in brackets] if they refer to other documents (eg the proposed standardised approach, or the market risk framework). References within this text are shown without brackets.

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 paragraphs \[102\] to \[181\]](#) 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 1 that follows, the III.B.1, the risk components \(e.g. PD and LGD\) and](#) asset classes (eg corporate exposures and retail exposures) [of eligible for](#) 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. [Not all exposure classes may however be modelled under the IRB approach, as outlined further below.](#)

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 (SL) 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 as defined in paragraph [13] and those securities firms and other financial institutions outlined in paragraph ~~65~~ [30] that are treated as exposures to banks under the standardised approach. 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 subclasses 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.

234a. The relevant PD floor that applies to QRRE depends on whether the exposures are QRRE transactors or QRRE revolvers. QRRE transactors are facilities such as credit cards and charge cards where the balance has always been repaid at each scheduled repayment date and that at least 6 months have passed since the facility was first used as a means of payment (the repayment date is typically the date after which interest charges come into effect on any balances carried forward). QRRE revolvers are all facilities that do not qualify as QRRE transactors, eg where balances have been carried forward past the scheduled repayment date. Banks that are unable to identify QRRE transactors must treat QRRE exposures as QRRE revolvers.

(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,¹ 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.² 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;³ 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 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

¹ 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.

² 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.

³ 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.

holding.⁴ This includes liabilities from which the return is linked to that of equities.⁵ 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:

- 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.⁶)

⁴ 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.

⁵ 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.

⁶ 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.

- The purchasing bank has a claim on all proceeds from the pool of receivables or a pro-rata interest in the proceeds.⁷
- 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 approach. Under the foundation approach [\(F-IRB approach\)](#), as a general rule, banks provide their own estimates of PD and rely on supervisory estimates for other risk components. Under the advanced approach [\(A-IRB approach\)](#), 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.

[245a. For certain of the portfolios defined in paragraphs 215 to 243 above, the IRB approaches are not permitted. Specifically:](#)

- (i) [Neither of the IRB approaches can be used \(and so the standardised approach must be used\) for the following exposures:](#)
 - [Exposures to banks \(paragraph 230\), securities firms and other financial institutions \(including insurance companies and any other financial institutions in the corporate asset class\).](#)
 - [Exposures to corporates belonging to a group with total consolidated assets exceeding EUR50bn.](#)
 - [Exposures to equities \(paragraphs 235 to 238\).](#)
- (ii) [The A-IRB approach cannot be used for exposures to corporates belonging to a group with total consolidated assets less than or equal to EUR50bn and annual revenues greater than EUR200m.](#)

⁷ Claims on tranches of the proceeds (first loss position, second loss position, etc.) would fall under the securitisation treatment.

- (iii) For SL exposures the only IRB approach that is permitted is the supervisory slotting approach (see paragraph 249).

In making the assessments above for the assets threshold and the revenues threshold, the amounts must be as reported in the audited financial statements of the corporates or their consolidated groups (according to the accounting standard applicable to the ultimate parent of the consolidated group). The figures must be based on the average amounts calculated over the prior three years, or on the latest amounts updated every three years by the bank.

[Section 5 of the IRB consultation document notes that the Committee is considering further the extent to which banks adopting the IRB approach should be required to apply it to all material asset classes for which the IRB approach remains available. Regarding the treatment of SL exposures, the QIS instructions notes that banks should to the extent possible assume that all specialised lending exposures currently under FIRB or AIRB migrate to the supervisory slotting criteria approach; however, where banks cannot slot, these exposures should be reported under the proposed revised standardised approach]

(i) *Corporate, ~~and 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.⁸

247. Under the advanced approach, banks must calculate the effective maturity (M)⁹ 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 ~~with exposures to SL 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.~~

⁸ 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.

⁹ At the discretion of the national supervisor, certain domestic exposures may be exempt from the calculation of M (see paragraph 319).

(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. ~~All equity exposures are subject to the standardised approach set out in paragraph [43]. 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.~~

(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. ~~The bank may use the A-IRB treatment for purchased corporate receivables (paragraphs 367, 368) only for exposures to corporates for which it has sufficient evidence to determine that the A-IRB approach is available according to paragraph 245a. The bank may use the F-IRB treatment for purchased corporate receivables (paragraph 366) only for exposures to corporates for which it has sufficient evidence to determine that the F-IRB approach is available according to paragraph 245a.~~ 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

[As noted in Section 5 of the IRB consultation document, the Committee is considering further the extent to which banks adopting the IRB approach should be required to apply it to all material asset classes for which the IRB approach remains available. The following paragraphs are therefore subject to change.]

256. Once a bank adopts an IRB approach for part of its holdings, it is expected to extend it across ~~the entire banking group~~ all classes of exposures for which the IRB approach is permitted, with the exception of the banking group's exposures to CCPs treated under Annex 4, Section IX. 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.~~

262(i). Irrespective of the materiality, exposures to CCPs arising from OTC derivatives, exchange traded derivatives transactions and SFTs must be treated according to the dedicated treatment laid down in Annex 4, Section XI. When assessing the materiality for the purposes of paragraph 259, the IRB coverage measure used must not be affected by the bank's amount of exposures to CCPs treated under Annex 4, Section XI – ie such exposures must be excluded from both the numerator and the denominator of the IRB coverage ratio used.

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.¹⁰ 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.¹¹ 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, and sovereign, and bank exposures

270. Section III.C presents the method of calculating the unexpected loss (UL) capital requirements for corporate, and sovereign and bank exposures. As discussed in Section C.1, one a

¹⁰ — 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.

¹¹ — 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.

~~single~~ risk-weight function is provided for determining the capital requirement for ~~all three asset classes with one exception~~ corporate and sovereign exposures. 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, ~~and sovereign, and bank~~ exposures

(i) Formula for derivation of risk-weighted assets for corporate and sovereign exposures

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 (eg euros), except where explicitly noted otherwise. For exposures not in default, the formula for calculating risk-weighted assets is:^{12, 13}

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

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

$$\text{Capital requirement}^{14} \text{ (K)} = \frac{[\text{LGD} \times \text{N}[(1 - \text{R})^{-0.5} \times \text{G}(\text{PD}) + (\text{R} / (1 - \text{R}))^{0.5} \times \text{G}(0.999)] - \text{PD} \times \text{LGD}] \times (1 - 1.5 \times \text{b})^{-1} \times (1 + (\text{M} - 2.5) \times \text{b})}{1}$$

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

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.

~~A multiplier of 1.25 is applied to the correlation parameter of all exposures to financial institutions meeting the following criteria:~~

~~— Regulated financial institutions whose total assets are greater than or equal to US \$100 billion. The most recent audited financial statement of the parent company and consolidated subsidiaries must be used in order to determine asset size. For the purpose of this paragraph, a regulated financial institution is defined as a parent and its subsidiaries where any substantial legal entity in the consolidated group is supervised by a regulator that imposes prudential requirements consistent with international norms. These include, but are not~~

¹² Ln denotes the natural logarithm.

¹³ 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 inverse cumulative distribution function for a standard normal random variable (i.e. the value of x such that 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.

¹⁴ If this calculation results in a negative capital charge for any individual sovereign exposure, banks should apply a zero capital charge for that exposure.

~~limited to, prudentially regulated Insurance Companies, Broker/Dealers, Banks, Thrifts and Futures Commission Merchants;~~

~~Unregulated financial institutions, regardless of size. Unregulated financial institutions are, for the purposes of this paragraph, legal entities whose main business includes: the management of financial assets, lending, factoring, leasing, provision of credit enhancements, securitisation, investments, financial custody, central counterparty services, proprietary trading and other financial services activities identified by supervisors.~~

~~$$\text{Correlation (R FI)} = 1.25 \times [0.12 \times (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))] + 0.24 \times [1 - (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))]$$~~

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~~ Banks are 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:

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, Banks~~ 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:~~

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

~~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.~~

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

~~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 sovereign 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.

285a. The exposure level PD estimates used for input into the determination of risk weights must not be less than 0.05%.

(ii) *Loss given default (LGD)*

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

286a. The exposure level LGDs used for input into the determination of risk weights for the advanced approach must not be less than the parameter floors indicated in the below table:

<u>LGD parameter floors</u>		
	<u>LGD</u>	
	<u>Unsecured</u>	<u>Secured</u>
<u>Corporate</u>	<u>25%</u>	<u>Varying by collateral type:</u> <ul style="list-style-type: none"><u>0% financial</u><u>15% receivables</u><u>15% commercial or residential real estate</u><u>20% other physical</u>

The LGD floors are only applicable in A-IRB approaches.

286b. The LGD floors for secured exposures in the table above (applicable for exposures under the advanced approach) apply when the exposure is fully secured (ie the value of collateral after the application of haircuts exceeds the value of the exposure). The LGD floor for a partially secured exposure is calculated as a weighted average of the unsecured LGD floor for the unsecured portion and the secured LGD floor for the secured portion. That is, the following formula should be used to determine the LGD floor:

$$Floor = LGD_{U\ floor} \cdot \frac{E_U}{E(1 + H_E)} + LGD_{S\ floor} \cdot \frac{E_S}{E(1 + H_E)}$$

Where:

- $LGDU_{floor}$ and $LGD_{S\ floor}$ are the floor values for fully unsecured and fully secured exposures respectively, as specified in the table in paragraph 286a.
- The other terms are defined as set out in paragraph 291 and 291a.

[Please note that this formula differs slightly from the formula set out in paragraph 4.2.4 in the IRB consultation document, as the IRB consultation document formula mistakenly left out the term H_E term, which is only relevant when the formula is used to calculate the LGD floor for counterparty credit risk exposures. In completing the QIS, banks should use the formula above.]

LGD under the foundation approach

Treatment of unsecured claims and non-recognised collateral

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

288. All subordinated claims on corporates, ~~and~~ 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 physical collateral, where they meet the minimum requirements set out in paragraphs 509 to 524.¹⁵ For eligible financial collateral, the requirements are identical to the operational standards as set out in the credit risk mitigation section of the standardised approach Section II.D beginning with paragraph 111.

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.~~

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

The LGD applicable to a collateralised transaction (LGD*) must be calculated as the exposure weighted average of the LGD applicable to the unsecured part of an exposure (LGD_U) and the LGD applicable to the collateralised part of an exposure (LGD_S). Specifically:

$$\text{LGD}^* = \text{LGD}_U \cdot \frac{E_U}{E(1 + H_E)} + \text{LGD}_S \cdot \frac{E_S}{E(1 + H_E)}$$

Where:

- E is the current value of the exposure (ie cash lent or securities lent or posted). In the case of securities lent or posted the exposure value has to be increased by applying the appropriate haircuts (H_E) according to the comprehensive approach for financial collateral.
- E_S is the current value of the collateral received after the application of the haircut applicable for the type of collateral (H_C) and for any currency mismatches between the exposure and

¹⁵ ~~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.~~

the collateral, as specified in paragraphs 291a to 291b. E_s is capped at the value of $E \cdot (1 + H_E)$.

- $E_U = E \cdot (1 + H_E) - E_s$. The terms E_U and E_s are only used to calculate LGD*. Banks must continue to calculate EAD without taking into account the presence of any collateral, unless otherwise specified.
- LGD_U = the downturn LGD applicable for an unsecured exposure, as set out in paragraph 287 to 288
- LGD_s = the downturn LGD applicable to exposures secured by the type of collateral used in the transaction, as specified in paragraph 291a.

291a. The following table specifies the LGD_s and haircuts applicable in the formula set out in paragraph 291:

<u>Type of collateral</u>	<u>LGD_s</u>	<u>Haircut</u>
<u>Eligible financial collateral</u>	<u>0%</u>	<u>As determined by the haircuts that apply in the comprehensive formula (paragraph [149] for jurisdictions that allow the use of ratings for regulatory purposes and paragraph [150] for jurisdictions that do not). The haircuts have to be adjusted for different holding periods and non-daily remargining or revaluation according to paragraphs [155 to 158].</u>
<u>Eligible Receivables</u>	<u>20%</u>	<u>50%</u>
<u>Eligible residential real estate / commercial real estate</u>	<u>20%</u>	<u>50%</u>
<u>Other eligible physical collateral</u>	<u>25%</u>	<u>50%</u>
<u>Ineligible collateral</u>	<u>N/A</u>	<u>100%</u>

291b. When eligible collateral is denominated in a different currency to that of the exposure, the haircut for currency risk is the same haircut that applies in the comprehensive approach (paragraph [151]).

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 for 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. Banks that lend securities or post collateral must calculate capital requirements for both of the following: (i) the credit risk or market risk of the securities, if this remains with the bank; and (ii) the counterparty credit risk arising from the risk that the borrower of the securities may default. For repo-style transactions, banks may recognise a reduction in the counterparty credit risk requirement arising from the effect of a master netting agreement providing that it satisfies the criteria set out in paragraphs [161] and [162]. The bank must calculate E^* , which is the exposure to be used for the counterparty credit risk charge

taking account of the risk mitigation of collateral received, using the formula set out in paragraph [164]. In applying the relevant formula to calculate risk weighted assets of the counterparty credit risk, E* must be used as the EAD of the counterparty and the LGD of the counterparty must be determined using the LGDs specified for unsecured exposures, as set out in paragraphs 287 and 288.

Use of models

293a. As an alternative to the use of standard haircuts for the calculation of the counterparty credit risk charge for SFTs set out in paragraph 293, banks may be permitted to use a VaR models approach to reflect price volatility of the exposures and the financial collateral. This approach can take into account the correlation effects between security positions. This approach applies to single SFTs and SFTs covered by netting agreements on a counterparty-by-counterparty basis, both under the condition that the collateral is revalued on a daily basis. This holds for the underlying securities being different and unrelated to securitisations. The master netting agreement must satisfy the criteria set out in paragraph [161] and [162]. The VaR models approach is available to banks that have received supervisory recognition for an internal market risk model according to paragraph [177] of "Minimum capital requirements for market risk". Banks which have not received market risk model recognition can separately apply for supervisory recognition to use their internal VaR models for the calculation of potential price volatility for SFTs, provided the model meets the requirements of paragraph [177]. Although the market risk standards have changed from a 99% VaR to a 97% expected shortfall, the VaR models approach to SFTs retains the use of a 99% VaR to calculate the counterparty credit risk for SFTs.

The VaR model needs to capture risk sufficient to pass the backtesting and profit and loss attribution tests of paragraph [183] of "Minimum capital requirements for market risk". The default risk charge of paragraph [186] is not required in the VaR model for SFTs.

293b. The quantitative and qualitative criteria for recognition of internal market risk models for SFTs are in principle the same as in paragraphs [180] and [181] of "Minimum capital requirements for market risk".

The minimum liquidity horizon or the holding period for SFTs is 5-business days for margined repo-style transactions, rather than the 10-business days in paragraph [181] (k). 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.

293c. The calculation of the exposure E* for banks using their internal model to calculate their counterparty credit risk charge will be the following:

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

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

293d. Subject to supervisory approval, instead of using the VaR approach, banks may also calculate an effective 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.

Carve out from the comprehensive approach

294. As in the standardised approach, for transactions where the conditions in paragraph ~~170~~ [135] are met, and in addition, the counterparty is a core market participant as specified in paragraph ~~171~~ [136], supervisors may choose not to apply the haircuts specified under the comprehensive approach, but instead to apply a zero H. A netting set that contains any transaction that does not meet the requirements in paragraph [135] is not eligible for this treatment.

[Please note, as set out in *Revisions to the Standardised Approach for credit risk - second consultative document*, the Committee is reviewing the core market participants exemption for continued relevance.]

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 ¹⁶	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. In the case where a bank has obtained multiple types of collateral it may apply the formula set out in paragraph 291 sequentially for each individual type of collateral. In doing so, after each step of recognising one individual type of collateral, the remaining value of the unsecured exposure (E_u) will be reduced by the adjusted value of the collateral (E_s) recognised in that step. In line with

¹⁶ Other collateral excludes physical assets acquired by the bank as a result of a loan default.

paragraph 291, the total of E_S across all collateral types is capped at the value of $E \cdot (1 + H_E)$. This results in the following formula:

$$LGD^* = LGD_U \cdot \frac{E_U}{(1 + H_E)} + \sum_i LGD_{S_i} \cdot \frac{E_{S_i}}{(1 + H_E)}$$

Where for each collateral type i:

- LGD_{S_i} is the LGD applicable to that form of collateral (as specified in paragraph 291a); and
- E_{S_i} is the current value of the collateral received after the application of the haircut applicable for the type of collateral (H_c) (as specified in paragraph 291a).

~~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.~~

LGD under the advanced approach

297. Subject to certain additional minimum requirements specified below ~~(and the conditions set out in paragraph 245a)~~, supervisors may permit banks to use their own internal estimates of LGD for corporate, ~~and 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.

~~297a. In cases where a bank has met the conditions to use their own internal estimates of LGD for a pool of unsecured exposures, and takes collateral against one of these exposures, it may not be able to model the effects of the collateral (ie it may not have enough data to model the effect of the collateral on recoveries). In such cases, the bank is permitted to apply the formula set out in paragraph 291, with the exception that the LGD_U term would be the bank's own internal estimate of the unsecured LGD. To adopt this treatment the collateral must be eligible under the F-IRB and the bank's estimate of LGD_U must not take account of any effects of collateral recoveries.~~

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 ~~in the calculation of counterparty credit risk~~. For banks using the advanced approach, own LGD estimates would be permitted for the unsecured equivalent amount (E^*)

used to calculate counterparty credit risk. In both cases banks, in addition to counterparty credit risk, must also calculate the capital requirements relating to any credit risk to which they remain exposed arising from the underlying securities in the master netting agreement.

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~~ [167] to [181]. 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~~ [167] to [172] 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. For example, when a bank has a subordinated claim on the borrower but the guarantee represents a senior claim on the guarantor this may be reflected by using an LGD applicable for senior exposures (see paragraph 287) instead of an LGD applicable for subordinated exposures. In other cases, e.g. when the borrower also provides collateral that reduces the LGD below the applicable level for senior unsecured exposures, and the bank has access to both the collateral and the guarantor in case of a default of the borrower, a bank may decide not to substitute the LGD.
- In case the bank applies the standardised approach to direct exposures to the guarantor it must assign the standardised approach risk weight to the covered portion of the exposure.

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~~ [178 to 179], and depends upon whether the cover is proportional or tranchéd.

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. In case the bank applies the standardised approach to direct exposures to the guarantor it must assign the standardised approach risk weight to the covered portion of the exposure.

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.¹⁷ Banks under the advanced IRB approach may recognise the risk mitigating effects of first-to-default credit derivatives, but may not recognise the risk mitigating effects of second-to-default or more generally nth-to-default credit derivatives.

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.~~

~~(a) — Single-name, unfunded credit derivatives (e.g. credit default swaps) or single-name guarantees.~~

~~(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.~~

~~(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.~~

~~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.~~

¹⁷ When credit derivatives do not cover the restructuring of the underlying obligation, the partial recognition set out in paragraph 192 [172] applies.

~~(b) — The entity selling credit protection is a bank¹⁸, 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 agencies¹⁹), 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.~~

~~(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.~~

~~(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.~~

¹⁸ This does not include PSEs and MDBs, even though claims on these may be treated as claims on banks according to paragraph 230.

¹⁹ By non-sovereign it is meant that credit protection in question does not benefit from any explicit sovereign counter-guarantee.

~~(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.~~

~~(i) The terms and conditions of credit protection arrangements must be legally confirmed in writing by both the credit protection provider and the bank.~~

~~(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.~~

(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~~ EAD: a foundation approach and an advanced approach.

~~310a. In the foundation approach, EAD is calculated as the committed but undrawn amount multiplied by a CCF. In the advanced approach, EAD for undrawn commitments may be calculated as the committed but undrawn amount multiplied by a CCF or derived from direct estimates of total facility EAD.~~

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 set out~~ in paragraphs ~~82 to 89~~ [64 to 74] ~~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 of the 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), and are not related to exposures for which the A-IRB approach is not permitted (see paragraph 245a) will be allowed to use their own internal estimates of CCFs EAD for undrawn revolving commitments to extend credit, purchase assets or issue credit substitutes across different product types provided the exposure is not subject to a CCF of 100% in the foundation approach (see paragraph 311). Standardised approach CCFs must be used for all other off-balance sheet items (for example, undrawn non-revolving commitments), and must be used where the minimum requirements for own estimates of EAD are not met. Own estimates of EAD are subject to a floor that is the sum of: (i) the on balance sheet amount and (ii) 50% of the off balance sheet exposure using the applicable CCF in the standardised approach.

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 (ie 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.
- For revolving exposures, effective maturity must be determined using the maximum contractual termination date of the facility. Banks must not use the repayment date of the current drawing.

321. The one-year floor does not apply to certain short-term exposures, comprising fully or nearly-fully collateralised²⁰ capital market-driven transactions (ie OTC derivatives transactions and margin lending) and repo-style transactions (ie repos/reverse repos and securities lending/borrowing) with an original maturity of less ~~then 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).

321a. The one-year floor also does not apply to the following exposures:

- (i) Short-term self-liquidating trade transactions. Import and export letters of credit and similar transactions should be accounted for at their actual remaining maturity.
- (ii) Issued as well as confirmed letters of credit that are short term (ie have a maturity below one year) and self-liquidating.

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 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;~~

²⁰ The intention is to include both parties of a transaction meeting these conditions where neither of the parties is systematically under-collateralised.

- [Some trade finance transactions that are not exempted by paragraph 321a.](#)
- 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~~ [156] 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~~ [111 to 115].

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 ~~the risk weight functions 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 secured²¹ by residential mortgages, risk weights will be assigned based on the following formula:

Correlation (R) = 0.15

²¹ This means that risk weights for residential mortgages also apply to the unsecured portion of such residential mortgages.

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

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

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 paragraphs 234 [and 234a](#) that are not in default, risk weights are defined based on the following formula:

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

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

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

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:

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

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

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

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.

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 [0.1% for QRRE revolvers \(see](#)

paragraph 234a for the definition of QRRE revolvers) or 0.05% for all other exposures. The LGDs used for input into the determination of risk weights must not be less than the parameter floors indicated in the table below:

LGD parameter floors

	<u>LGD</u>	
	<u>Unsecured</u>	<u>Secured</u>
<u>Retail classes:</u>		
<u>Mortgages</u>	<u>N/A</u>	<u>10%</u>
<u>QRRE transactors</u>	<u>50%</u>	<u>N/A</u>
<u>QRRE revolvers</u>	<u>50%</u>	<u>N/A</u>
<u>Other retail</u>	<u>30%</u>	<u>Varying by collateral type:</u> <ul style="list-style-type: none"> • <u>0% financial</u> • <u>15% receivables</u> • <u>15% commercial or residential real estate</u> • <u>20% other physical</u>

The LGD floors for partially secured exposures in the "other retail" category should be calculated according to the formula set out in paragraph 286b. The LGD floor residential mortgages is fixed at 10%.

(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. In case the bank applies the standardised approach to direct exposures to the guarantor it must assign the standardised approach risk weight to the covered portion of the exposure.

333. Consistent with the requirements outlined above for corporate, ~~and 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 ~~[166]188~~ of the standardised approach. ~~For retail off-balance sheet items, b~~Banks must use their own estimates of ~~CCFs provided~~ EAD for undrawn revolving commitments to extend credit, purchase assets or issue credit substitutes

provided the exposure is not subject to a CCF of 100% in the foundation approach (see paragraph 311) and the minimum requirements in paragraphs 474 to 477 and 479 are satisfied (the 'advanced approach'). Foundation approach CCFs must be used for all other off-balance sheet items (for example, undrawn non-revolving commitments), and must be used where the minimum requirements for own estimates of EAD are not met.

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 sub-divided 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:²²

- — 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 corporate entity where the

²² There is no advanced approach for equity exposures, given the 90% LGD assumption.

~~bank holds debt.²³ 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.~~

~~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.~~

²³ 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.

(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.²⁴

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 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.

²⁴ — [This does not affect the existing allowance of 45% of unrealised gains to Tier 2 capital in the 1988 Accord.](#)

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.²⁵ 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

²⁵ 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.

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 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.²⁶ 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

²⁶ 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).

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.

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 307.²⁷ 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.~~

²⁷ 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.

~~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 exposures subject to the supervisory slotting criteria*

376. Banks must calculate an EL as PD x 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 for exposures on the foundation approach banks~~ must use the supervisory LGD. For ~~SL~~ exposures subject to the 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 (ie 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 PD²⁸ 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.

²⁸ Banks are not required to produce their own estimates of PD for exposures subject to the supervisory slotting approach ~~certain equity exposures and certain exposures that fall within the SL sub-class.~~

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.

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 (eg 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 (ie 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, ~~and 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 exposures subject to the foundation IRB approach-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 exposures subject to the supervisory slotting approaches, 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 sub-class.~~

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 (eg borrower type, demographics such as age/occupation);
- Transaction risk characteristics, including product and/or collateral types (eg loan to value measures, seasoning^{footnote}, 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.

footnote: For each pool where the banks estimate PD and LGD banks should analyse the representativeness of the age of the facilities (in terms of time since origination for PD and time since the date of default for LGD) in the data used to derive the estimates to the bank's actual facilities. In some jurisdictions default rates peak several years after origination or recovery rates show a low point several years after default, banks should adjust the estimates with an adequate margin of conservatism to account for the lack of representativeness as well as anticipated implications of rapid exposure growth. For other jurisdictions defaults occur during the first period.

(ii) Rating structure

Standards for corporate, ~~and 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 Exposures subject to the supervisory slotting approach~~

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. Rating systems should be designed in such a way that assignments to ratings categories should generally remain stable over time and throughout business cycles; migration from one category to another should generally be due to idiosyncratic or industry specific changes rather than due to business cycles.

~~415(i).— PD estimates for borrowers that are highly leveraged or for borrowers whose assets are predominantly traded assets must reflect the performance of the underlying assets based on periods of stressed volatilities.~~

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, ~~and~~ 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. [Those policies must include a process for the identification of specific wrong way risk for each legal entity to which the bank is exposed. Transactions with counterparties where specific wrong way risk has been identified need to be treated differently when calculating the EAD for such exposures \(see paragraph 58, Annex 4\).](#)

(ii) Integrity of rating process

Standards for corporate, ~~and~~ 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, ~~and~~ 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 (eg 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.²⁹ 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 regularly to discuss the performance of the rating process, areas needing improvement, and the status of efforts to improve previously identified deficiencies.

²⁹ 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.

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 PD³⁰ for each internal borrower grade for corporate, ~~and~~ 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~~) ~~as set out in paragraph 465 and 466~~. Requirements specific to PD estimation are provided in paragraphs 461 to ~~466~~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~~ For exposures on the advanced approach, banks 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, ~~and~~ 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 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

³⁰ Banks are not required to produce their own estimates of PD for exposures subject to the supervisory slotting approach ~~certain equity exposures and certain exposures that fall within the SL sub-classes~~.

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.³¹ 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 unlikeliness 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.³²
- 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.³³
- 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.
- 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

³¹ 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.

³² In some jurisdictions, specific provisions on equity exposures are set aside for price risk and do not signal default.

³³ Including, in the case of equity holdings assessed under a PD/LGD approach, such distressed restructuring of the equity itself.

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, ~~and~~ 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.

For all methods above, banks must estimate a PD for each rating grade based on the observed historical average one-year default rate that is a simple average based on number of obligors (count weighted). Other weighting approaches, except the weighting described in paragraph 463, such as EAD weighting, are not permitted.

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. The data should include a representative mix of good and bad years. The minimum weighting of data from downturn years should not be less than one in ten years.

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. The data should include a representative mix of good and bad years of the economic cycle relevant for the portfolio. The minimum weighting of data from downturn years should be not less than one in ten years. The PD should be based on the observed historical average one-year default rate. 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. Banks must estimate the LGD for each fully unsecured facility as the sum of the following two components that banks must estimate separately: (i) a long run average LGD; and (ii) an add-on to reflect the increase in LGD expected during economic downturn conditions. [Footnote i] In addition, a bank must The add-on component for fully unsecured facilities and the LGD for secured facilities must be calculated to 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~~ make reference to the 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.

[Footnote i] The requirement of this paragraph for banks to estimate separately for fully unsecured facilities the long run average component of the downturn LGD and downturn add-on component does not apply to defaulted assets.

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 foundation IRB 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 ~~327a 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, and 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 b~~ Banks using the advanced approach 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 Under the advanced approach, banks must assign an estimate of EAD for each eligible 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. Moreover, where a bank bases its estimates on alternative measures of central tendency (such as the median or a higher percentile estimate) or only on 'downturn' data, it should explicitly confirm that the basic downturn requirement of the framework is met, ie the bank's estimates do not fall below a (conservative) estimate of the long-run default-weighted average EAD for similar facilities.

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.

477a. Banks' EAD estimates must be developed using a 12-month fixed-horizon approach; ie for each observation in the reference data set, default outcomes must be linked to relevant obligor and facility characteristics twelve months prior to default.

477b. As set out in paragraph 450, banks' EAD estimates should be based on reference data that reflect the obligor, facility and bank management practice characteristics of the exposures to which the estimates are applied. Consistent with this principle, EAD estimates applied to particular exposures should not be based on data that comingle the effects of disparate characteristics or data from exposures that exhibit different characteristics (eg same broad product grouping but different customers that are managed differently by the bank). The estimates should be based on appropriately homogenous segments. Alternatively, the estimates should be based on an estimation approach that effectively disentangles the impact of the different characteristics exhibited within the relevant dataset. Practices that generally do not comply with this principle include use of estimates based or partly based on:

- SME/midmarket data being applied to large corporate obligors.
- Data from commitments with 'small' unused limit availability being applied to facilities with 'large' unused limit availability.
- Data from obligors already identified as problematic at reference date being applied to current obligors with no known issues (eg customers at reference date who were already delinquent, watchlisted by the bank, subject to recent bank-initiated limit reductions, blocked from further drawdowns or subject to other types of collections activity).
- Data that has been affected by changes in obligors' mix of borrowing and other credit-related products over the observation period unless that data has been effectively mitigated for such changes, eg by adjusting the data to remove the effects of the changes in the product mix. Supervisors should expect banks to demonstrate a detailed understanding of the impact of changes in customer product mix on EAD reference data sets (and associated EAD estimates) and that the impact is immaterial or has been effectively mitigated within each bank's estimation process. Banks' analyses in this regard should be actively challenged by supervisors. Effective mitigation would not include: setting floors to CCF/EAD observations; use of obligor-level estimates that do not fully cover the relevant product transformation options or inappropriately combine products with very different characteristics (eg revolving and non-revolving products); adjusting only 'material' observations affected by product transformation; generally excluding observations affected

by product profile transformation (thereby potentially distorting the representativeness of the remaining data).

477c. A well-known feature of the commonly used undrawn limit factor (ULF) approach [footnote i] to estimating CCFs is the region of instability associated with facilities close to being fully drawn at reference date. Banks should ensure that their EAD estimates are effectively quarantined from the potential effects of this region of instability.

- An acceptable approach could include using an estimation method other than the ULF approach that avoids the instability issue by not using potentially small undrawn limits that could approach zero in the denominator or, as appropriate, switching to a method other than the ULF as the region of instability is approached, eg a limit factor, balance factor or additional utilisation factor approach.[footnote ii]
 - Note that, consistent with paragraph 477b, including limit utilisation as a driver in EAD models could quarantine much of the relevant portfolio from this issue but, in the absence of other actions, leaves open how to develop appropriate EAD estimates to be applied to exposures within the region of instability.
- Common but ineffective approaches to mitigating this issue include capping and flooring reference data (eg observed CCFs at 100 per cent and zero respectively) or omitting observations that are judged to be affected.

[footnote i] A specific type of CCF, where predicted additional drawings in the lead-up to default are expressed as a percentage of the undrawn limit that remains available to the obligor under the terms and conditions of a facility, ie $EAD = B_0 = B_t + ULF[L_t - B_t]$, where B_0 = facility balance at date of default; B_t = current balance (for predicted EAD) or balance at reference date (for observed EAD); L_t = current limit (for predicted EAD) or limit at reference date (for realised/observed EAD).

[footnote ii] A limit factor (LF) is a specific type of CCF, where the predicted balance at default is expressed as a percentage of the total limit that is available to the obligor under the terms and conditions of a credit facility, ie $EAD = B_0 = LF[L_t]$, where B_0 = facility balance at date of default; B_t = current balance (for predicted EAD) or balance at reference date (for observed EAD); L_t = current limit (for predicted EAD) or limit at reference date (for realised/observed EAD). A balance factor (BF) is a specific type of CCF, where the predicted balance at default is expressed as a percentage of the current balance that has been drawn down under a credit facility, ie $EAD = B_0 = BF[B_t]$. An additional utilisation factor (AUF) is a specific type of CCF, where predicted additional drawings in the lead-up to default are expressed as a percentage of the total limit that is available to the obligor under the terms and conditions of a credit facility, ie $EAD = B_0 = B_t + AUF[L_t]$.

477d. EAD reference data must not be capped to the principal amount outstanding or facility limits. Accrued interest, other due payments and limit excesses should be included in EAD reference data.

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, and 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, ~~and 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."

482(i) In case the bank applies the standardised approach to direct exposures to the guarantor it must assign the standardised approach risk weight to the covered portion of the exposure.

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. The guarantee 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. However, as an exception for the purposes of own estimates of EAD under the A-IRB, guarantees that only cover loss remaining after the bank has first pursued the original obligor for payment and has completed the workout process may be recognised. 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.

484(i) In case of guarantees where the bank assigns the standardised approach risk weight to the covered portion of the exposure the scope of guarantors and the minimum requirements as under the standardised approach apply.

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 (eg 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, the credit risk mitigation section \(section D\) of the standardised approach](#)). 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;³⁴ 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.

³⁴ 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.

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.³⁵

(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 (eg 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.³⁶ Junior liens may be taken into account where there is no doubt that the claim for collateral is legally enforceable and constitutes an efficient credit risk mitigant. ~~Where junior liens are recognised the value of the collateral after haircuts must be reduced by the value of the collateral after haircuts attributable to liens that rank higher than the junior lien. 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.

~~³⁵ 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.~~

³⁶ In some of these jurisdictions, first liens are subject to the prior right of preferential creditors, such as outstanding tax claims and employees' wages.

- 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, eg 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 physical collateral

521. Supervisors may allow for recognition of the credit risk mitigating effect of certain other physical collateral when the following conditions are met. Each supervisor will determine which, if any, collateral types in its jurisdiction meet the following two standards:

- Existence The bank demonstrates to the satisfaction of the supervisor that there are ~~of~~ liquid markets for disposal of collateral in an expeditious and economically efficient manner. Banks must carry out a reassessment of this condition both periodically and when information indicates material changes in the market.
- Existence The bank demonstrates to the satisfaction of the supervisor that there are ~~of~~ well established, publicly available market prices for the collateral. Banks must also demonstrate that the amount they receive. 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 36, 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 and the right to examine and revalue the collateral whenever this is deemed necessary by the lending bank 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 (eg raw materials, work-in-process, finished goods, dealers’ inventories of autos) and equipment, the periodic revaluation process must include physical inspection of the collateral.

522a. General Security Agreements, and other forms of floating charge, can provide the lending bank with a registered claim over a company’s assets. In cases where the registered claim includes

both assets that are not eligible as collateral under the F-IRB and assets that are eligible as collateral under the F-IRB, the bank may recognise the latter. Recognition is conditional on the claims meeting the operational requirements set out paragraphs 506 to 522.

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.