

The Internal Ratings-Based (IRB) Approach to Credit Risk

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A. Introduction

211. This Directive describes the Internal Ratings-Based (IRB) approach to credit risk. Subject to certain minimum conditions and disclosure requirements, banking corporations that have received the Supervisor's 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, banking corporations may be required to use a supervisory value instead of 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. EL are treated separately, as outlined in Section G below.
213. In this Directive, the asset classes are defined first. Adoption of the IRB approach across all asset classes is also discussed early in this Directive. The risk components, each of which is defined later in this Directive, 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 (QRRE). 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 (CRM). The legal certainty standards for recognizing CRM as set out in Chapter D of Proper Conduct of Banking Business Directive 203 (Standardized Approach) apply for both the foundation and advanced IRB approaches. The minimum requirements that banking corporations must satisfy to use the IRB approach are presented in this Directive from Paragraph 387 of Section H onward.

B. Mechanics of the IRB approach

214. In Section B.1, the risk components (e.g., PD and LGD) and asset classes (e.g., corporate exposures and retail exposures) of the IRB approach are defined. Section B.2 describes the risk components to be used by banking corporations by asset class. Section B.3 discusses a banking corporation's adoption of the IRB approach. In cases where an IRB treatment is not specified, the risk weight for these exposures is 100%, except when a 0% risk weight applies under Proper Conduct of Banking Business Directive 203 (Standardized Approach), and the resulting risk-weighted assets are assumed to represent UL only.

1. Categorization of exposures

215. Under the IRB approach, banking corporations must categorize 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 subclasses of specialized lending are separately identified. Within the retail asset class, three subclasses are separately identified. Within the corporate and retail asset classes, a distinct treatment for purchased receivables may also apply provided certain conditions are met.

216. The classification of exposures in this way is broadly consistent with established bank practice. However, some banking corporations may use different definitions in their internal risk management and measurement systems. While it is not the intention of the Banking Supervision Department to require banking corporations to change the way in which they manage their business and risks, banking corporations are required to apply the appropriate treatment to each exposure for the purposes of deriving their minimum capital requirement. Banking corporations must demonstrate to the Supervisor that their methodology for assigning exposures to different classes is appropriate and consistent over time.

217. For a discussion of the IRB treatment of securitization exposures, see Proper Conduct of Banking Business Directive 205.

(i) Definition of corporate exposures

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

219. Within the corporate asset class, five subclasses of specialized 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 specialized lending are project finance, object finance, commodities finance, income-producing real estate, and high-volatility commercial real estate. Each of these subclasses 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, and transportation, environmental, 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 revenue flow generated by the contracts for the facility's output, such as the electricity sold by a power plant. The borrower is usually incorporated as 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 the collateral value of the project's assets. In contrast, if repayment of the exposure depends primarily on a well established, diversified, credit-worthy, and 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 motor vehicle 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 collateralized 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 the self-liquidating nature of the specific commodity and the lender's skill in structuring the transaction rather than the credit quality of the borrower.

225. The Banking Supervision Department believes that such lending can be distinguished from exposures financing the reserves, inventories, or receivables of other more diversified corporate borrowers. Banking corporations 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 (e.g., 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 collateralized by real estate is the strong positive correlation between the prospects of repayment of the exposure and the prospects of 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) than other types of SL. HVCRE includes loans financing the acquisition, development and construction (ADC) of a property, 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 from borrower equity are, however, ineligible for the additional reductions for SL exposures described in Paragraph 277.

The Banking Supervision Department may broaden the definition of HVCRE to include asset-securitized exposures that, in the Supervisor's opinion, belong to high default volatility portfolios and lending for different phases of the same properties.

228. Deleted.

(ii) *Definition of sovereign exposures*

229. This asset class covers all exposures to counterparties treated as sovereigns under the standardized approach (Proper Conduct of Banking Business Directive 203). This includes sovereigns (and their central banks), certain PSEs identified as sovereigns in the standardized approach, MDBs that meet the criteria for a 0% risk weight under the standardized approach, and the entities referred to in Paragraph 56 of Proper Conduct of Banking Business Directive 203.

(iii) *Definition of bank exposures*

230. This asset class covers exposures to banks (as defined in Paragraph 60 of Proper Conduct of Banking Business Directive 203 [Standardized Approach]) and those securities firms outlined in Paragraph 65 of Proper Conduct of Banking Business Directive 203. Bank exposures also include claims on domestic PSEs that are treated like claims on banks under the standardized approach, and MDBs that do not meet the criteria for a 0% risk weight under the standardized approach.

(iv) *Definition of retail exposures*

231. An exposure is categorized 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., installment 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, if the borrower’s aggregate exposure does not exceed NIS 5 million. Exposures larger than NIS 5 million are defined as corporate exposures.

It is clarified that exposure to individuals does not include credit with a business guarantee or collateral.

- Residential mortgage loans (including first and subsequent liens, term loans, and revolving home-equity lines of credit), at an amount that does not exceed NIS 5 million, are eligible for retail treatment regardless of exposure size so long as the credit is extended to an individual who is an owner-occupier of the property. The definition includes 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.

Credit for financing activity of a business nature is not included in this class.

An exposure is placed in the residential mortgage-loan category only if its underwriting characteristics resemble the standard underwriting characteristics of a mortgage loan extended by the banking corporation to an individual (including the LTV ratio). In any event, the LTV ratio shall not exceed 100 percent on the day said loan is issued.

- 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 NIS 5 million. Small-business loans extended through or guaranteed by an individual are subject to the same exposure threshold.

A private account of a controlling principal of a business (incorporated or not) shall be examined together with the business' books en bloc. The aggregate exposure shall be categorized as a retail one (small retail business) only if it does not exceed NIS 5 million.

In the event of a combined business/private exposure, said exposure is defined as an exposure to an individual only where the business component is not material relative to total activity.

Large number of exposures

232. The exposure must be one of a large pool of exposures, which are managed by the banking corporation on a pooled basis.

Small-business exposures below NIS 5 million may be treated as retail exposures if the banking corporation 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, banking corporations are required to identify separately three sub-classes of exposures: (a) exposures secured by residential properties as defined above, (b) qualifying revolving retail exposures, as defined in the following Paragraph, and (c) all other retail exposures.

(v) *Definition of qualifying revolving retail exposures*

234. All of the following criteria must be satisfied for a sub-portfolio to be treated as a qualifying revolving retail exposure (QRRE). These criteria must be applied at a sub-portfolio level consistent with the banking corporation's sub-portfolio segmentation of its retail activities in general. Segmentation into sub-portfolios at the national level is 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 banking corporation.
 - (b) The exposures are to individuals.
 - (c) The maximum exposure to a single individual in the sub-portfolio is NIS 500,000 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, banking corporations 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.

- (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 treatment of QRRE must be consistent with the underlying risk characteristics of the sub-portfolio.

(vi) *Definition of equity exposures*

235. In general, equity exposures are defined on the basis of the economic substance of the instrument. They include both direct and indirect ownership interests⁵⁹, 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 the provisions of Proper Conduct of Banking Business Directive 202.⁶⁰ An instrument is considered 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 categorized as an equity exposure:

- An instrument with the same structure as those permitted as Tier 1 capital for banking corporations.
- 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 the issuance of a fixed number of the issuer's equity shares;

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

⁶⁰ Deleted.

- (3) The obligation requires (or permits at the issuer's discretion) settlement by the issuance of a variable number of the issuer's equity shares and (ceteris paribus) any change in the value of the obligation is attributable to, comparable to, and in the same direction as, the change in the value of a fixed number of the issuer's equity shares;⁶¹ or,
- (4) The holder has the option to require that the obligation be settled in equity shares, unless either (i) in the case of a traded instrument, the Supervisor is convinced that the banking corporation has demonstrated that the instrument trades more like the debt of the issuer than like its equity, or (ii) in the case of nontraded instruments, the Supervisor is convinced that the banking corporation has demonstrated that the instrument should be treated as a debt position. In cases (i) and (ii), the banking corporation may decompose the risks for regulatory purposes, with the consent of the Supervisor.

237. Debt obligations and other securities, partnerships, derivatives or other vehicles structured with the intent of conveying the economic substance of equity ownership are considered an equity holding.⁶² This includes liabilities from which the return is linked to that of equities⁶³. Conversely, equity investments that are structured with the intent of conveying the economic substance of debt holdings or securitization exposures would not be considered an equity holding.

238. The Banking Supervision Department has the discretion to re-characterize debt holdings as equities for regulatory purposes and to otherwise ensure the proper

⁶¹ For certain obligations that require or permit settlement by issuance of a variable number of the issuer's equity shares, the change in the monetary value of the obligation is equal to the change in the fair value of a fixed number of equity shares multiplied by a specified factor. Those obligations meet the conditions of Subparagraph 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.

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

⁶³ Deleted.

treatment of holdings under Proper Conduct of Banking Business Directive 211 (capital adequacy assessment process).

(vii) *Definition of eligible purchased receivables*

239. Eligible purchased receivables are receivables purchased by a banking corporation, are those that are recorded in the balance sheet as its receivables under Generally Accepted Accounting Principles, and that meet the eligibility requirements set forth below. Eligible purchased receivables are divided into retail and corporate receivables as defined below:

Retail receivables

240. Purchased retail receivables, provided the purchasing banking corporation 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 banking corporation must also apply the minimum operational requirements as set forth in Sections F and H below.

Corporate receivables

241. In general, for purchased corporate receivables, banking corporations are expected to assess the default risk of individual obligors as specified in Section C.1 below (starting with Paragraph 271) consistent with the treatment of other corporate exposures. However, the top-down approach may be used, provided that the purchasing banking corporation's program 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 banking corporation to be subjected to the minimum requirements for the IRB approach to corporate exposures that would otherwise apply but absent this burden the bank would meet the minimum requirements. Primarily, it is intended for receivables that are purchased for inclusion in asset-backed securitization structures, but banking corporations may also use this approach, with the

Supervisor’s approval, for appropriate on-balance-sheet exposures that share the same features.

242. The top-down approach may be used for purchased corporate receivables only if the banking corporation satisfies the minimum requirements. In particular, the purchased corporate receivables must satisfy the following conditions:

- The receivables are purchased from unrelated, third-party sellers and, as such, the banking corporation has not originated the receivables either directly or indirectly.
- The receivables must be generated on an arm’s-length basis between the seller and the obligor. (As such, intercompany accounts receivable and receivables subject to contra-accounts between firms that buy and sell to each other are ineligible.⁶⁴)
- The purchasing banking corporation has a claim on all proceeds from the pool of receivables or a pro-rata interest in the proceeds.⁶⁵
- The pool of receivables is adequately diversified, under the documented criteria that the banking corporation has set forth.

243. The existence of full or partial recourse to the seller does not automatically disqualify a banking corporation 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 banking corporation meets the eligibility criteria and operational requirements.

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

⁶⁵ Claims on tranches of the proceeds (first loss position, second loss position, etc.) are treated under Proper Conduct of Banking Business Directive 205 concerning securitization.

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 banking corporations 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 banking corporation to use the IRB approach for a given asset class.

245. For many of the asset classes, two broad approaches are allowed: foundation (FIRB) and advanced (AIRB). Under the foundation approach, as a general rule, banking corporations provide their own estimates of PD and rely on supervisory estimates for other risk components. Under the advanced approach, banking corporations 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, banking corporations must always use the risk-weight functions which are described in this Directive for the purpose of deriving capital requirements. The full suite of approaches is described below.

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

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

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

⁶⁶ Deleted.

⁶⁷ Deleted.

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

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

249. Banking corporations that do not meet the requirements for the estimation of PD under the corporate foundation approach (FIRB) 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. Banking corporations that meet the requirements for the estimation of PD may use the FIRB approach to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE.

251. Banking corporations that meet the requirements for the estimation of PD, LGD, and EAD may use the AIRB to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE.

(ii) *Retail exposures*

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

(iii) *Equity exposures*

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

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

(iv) *Eligible purchased receivables*

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

3. *Adoption of the IRB approach across asset classes*

256. Once a banking corporation adopts the IRB approach for part of its holdings, it is expected to extend it across the entire banking group, except for the banking group's exposures to central counterparties that are dealt with in the framework of Section IX of Appendix C to Proper Conduct of Banking Business Directive 203. The Banking Supervision Department recognizes, however, that for various reasons many banking corporations cannot implement the IRB approach across all main asset classes and business units at the same time. Furthermore, even after a bank adopts the IRB approach, data limitations may mean that banking corporations 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. Accordingly, the Supervisor may allow banking corporations to adopt a phased rollout of the IRB approach across the banking group. The phased rollout includes (i) adoption of IRB across asset classes (or, in the case of retail exposures, across individual subclasses) within the same business unit; (ii) adoption of IRB across business units in the same banking group; and (iii) switching from the foundation IRB approach to the advanced approach for certain risk components. However, when a banking corporation adopts an IRB approach for an asset class (or, in the case of retail exposures, for an individual subclass) within a particular business unit, it must apply the IRB approach to all exposures within that asset class (or subclass) in that unit.

In this matter, the following is stated for clarity:

- Apart from exceptional cases, approval will not be extended to a banking corporation's plan in which the adoption period is longer than three years and does not cover, on the initial date of implementation, at least 60 percent of the capital requirement on account of credit risk, in terms of risk-weighted assets, as calculated using the standardized approach (Proper Conduct of Banking Business Directive 203).
 - The denominator in the calculation includes all risk-weighted assets (as calculated using the standardized approach), including assets temporarily or permanently exempted from the application of the IRB.
 - The supervisory slotting criteria approach to SL exposures is an integral part of the IRB approach. Accordingly, risk-weighted assets for SL are also included in the denominator and in the numerator (in the denominator in any case and in the numerator if the bank already intends to treat said assets under the IRB approach on the relevant day for calculation).
- Capital on an asset class not included in the IRB approach will be calculated during the phased adoption period, using the standardized approach.

258. A banking corporation must produce an implementation plan that specifies to what extent and when it intends to roll out IRB approaches across significant asset classes (or subclasses in the case of retail) and business units over time. The plan should be exacting, yet realistic, and must have received the Supervisor's approval. It should be driven by the practicality and feasibility of moving to the more advanced approaches, and not motivated by a desire to adopt the approach in the Directives that minimizes its capital charge. During the roll-out period, the Supervisor will ensure that no capital relief is granted for intra-group transactions that are designed to reduce a banking group's aggregate capital charge by transferring credit risk among entities that adopted the standardized approach (Proper Conduct of Banking Business Directive 203) and

foundation and advanced IRB approaches. This includes, but is not limited to, asset sales and cross guarantees.

259. Some exposures in non-significant business units as well as asset classes (or subclasses in the case of retail exposures) that are immaterial in terms of size and perceived risk profile may be exempt from the requirements in the previous two Paragraphs, subject to the Supervisor's specific approval. Capital requirements for such exposures will be determined according to the standardized approach (Proper Conduct of Banking Business Directive 203), with the Supervisor determining whether the banking corporation should hold more capital for such positions under Proper Conduct of Banking Business Directive 211 (capital adequacy assessment process).

A rate of 15% or more of the total banking corporation's risk assets, in terms of risk weighted assets in accordance with the standardized approach is considered material.

It is clarified that:

- In calculating the 15% minimum, the numerator applies to all risk assets, which were excluded from implementation of the IRB approach, as calculated in accordance with the standardized approach.
- In calculating the 15% minimum, the denominator includes all the risk weighted assets in accordance with the approach through which they are being calculated. Hence, assets not excluded from the implementation of the IRB approach, as calculated in accordance with the IRB approach, and assets excluded from the implementation of the IRB approach, as calculated in accordance with the standardized approach.
- Regarding special loans (SL) – see paragraph 257.
- In addition to this paragraph, there is a specific immateriality paragraph (Paragraph 358) regarding the exclusion of equity exposure, which is based on the extent of Tier 1 and Tier 2 capital. The equity exposure excluded in accordance with paragraph 358 is added to the numerator and to the denominator for the purpose of testing the 15% minimum.

260. Notwithstanding the foregoing, once a banking corporation 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. The Supervisor may require a banking corporation to employ one of the IRB equity approaches if its equity exposures are a significant part of the banking corporation's business, even though the banking corporation may not employ an IRB approach in its other business lines. Further, once a banking corporation has adopted the general IRB approach for corporate exposures, it must adopt the IRB approach for the SL subclasses within the corporate exposure class.
261. Banking corporations adopting the IRB approach are expected to continue to employ it. A voluntary return to the standardized approach (Proper Conduct of Banking Business Directive 203) or the foundation approach (FIRB) is permitted only in extraordinary circumstances, such as the divestiture of a large fraction of the banking corporation's credit-related business, and must be approved by the Supervisor.
262. Given the data limitations associated with SL exposures, a banking corporation may remain on the supervisory slotting criteria approach for one or more of the PF, OF, CF, IPRE or HVCRE subclasses, and move to the foundation or advanced IRB approach for other subclasses within the corporate asset class.
- 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 Section IX of Appendix C to Proper Conduct of Banking Business Directive 203. When assessing the materiality for the purposes of Section 259, the IRB coverage measure used must not be affected by the banking corporation's amount of exposures to CCPs treated under Section IX of Appendix C to Proper Conduct of Banking Business

Directive 203. That is, such exposures must be excluded from both the numerator and denominator of the IRB coverage ratio used.

4. Transition arrangements

263–269. Deleted^{68,69}.

C. Rules for corporate, sovereign, and bank exposures

270. Section C presents the method of calculating unexpected loss (UL) capital requirements for corporate, sovereign, and bank exposures. As mentioned in Section C.1, one risk-weight function is provided for determining the capital requirement for all three asset classes with one exception. Supervisory risk weights have been established for each of the specialized lending subclasses of corporates, and a separate risk-weight function has been established 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 G below.

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

(i) Formula for derivation of risk-weighted assets

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

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

⁶⁸ Deleted.

⁶⁹ Deleted.

⁷⁰ Ln denotes the natural logarithm.

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

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

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

Capital requirement⁷²

$$(K) = \left\{ \text{LGD} * N \left[\sqrt{\frac{1}{1-R}} * G(PD) + \sqrt{\frac{R}{1-R}} * G(0.999) \right] - PD * \text{LGD} \right\} * \frac{1 + (M - 2.5) * b}{1 - 1.5 * b}$$

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

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 banking corporation'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 of all exposures to financial institutions that meet the following criteria:

- A regulated financial institution whose total assets are greater than or equal to \$100 million. To determine the value of an asset, the most up-to-date financial statements of the parent company and of the consolidated subsidiary companies are to be used. For the purpose of this Paragraph, a regulated financial institution is defined as a parent company and its subsidiaries, where each material legal entity in the consolidated group is supervised by a regulator who enforces the requirements for maintaining systemic stability in accordance with

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.

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

international norms. These include, inter alia, entities that are subject to regulation such as insurance companies, brokers and dealers, banks, thrifts, and futures commission merchants.

- Unregulated financial institutions, regardless of their size. Unregulated financial institutions, for the purpose of this Paragraph, are legal entities whose principal field of activity includes: financial asset management, loans, factoring, leasing, providing credit enhancers, securitization, investments, financial trusts, services to main counterparties, proprietary trading, and providing other financial services defined by the supervisors.

The correlation (R_{FI}):

$$(R_{FI}) = 1.25 * \left\{ 0.12 * \frac{1 - EXP(-50 * PD)}{1 - EXP(-50)} + 0.24 * \left[1 - \frac{1 - EXP(-50 * PD)}{1 - EXP(-50)} \right] \right\}$$

Illustrative risk weights are shown in Appendix A.

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

273. Under the IRB approach for corporate credits, banking corporations are 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 are less than NIS 250 million) from those to large firms.

A firm-size adjustment (i.e., $0.04 * \left(1 - \frac{S - 25}{225} \right)$) is made to the corporate risk

weight formula for exposures to SME borrowers. S is expressed as total annual sales in millions of NIS with values of S falling in the range of equal to or less than NIS 250 million or greater than or equal to NIS 25 million. Reported sales of less than NIS 25 million will be treated as if they were equivalent to NIS 25 million for the purposes of the firm-size adjustment for SME borrowers.

Correlation (R) is calculated as follows:

$$(R) = 0.12 * \frac{1 - EXP(-50 * PD)}{1 - EXP(-50)} + 0.24 * \left[1 - \frac{1 - EXP(-50 * PD)}{1 - EXP(-50)} \right] - 0.04 * \left(1 - \frac{S - 25}{225} \right)$$

Explanatory notes:

1. When there is no way of determining with strong probability that annual sales of the borrower's group are under NIS 250 million, the borrower shall not be classified as an SME. This happens, for example, when up-to-date financial statements of some corporate members of the group, whose sales according to past data are material for the group, are unobtainable and no other up-to-date and firmly grounded indication of these corporations' sales exists.
 2. From the moment the group's annual sales cross the NIS 250 million threshold, the constituent borrowers in the group shall be classified as Corporate (non-SME) even if group sales fall below NIS 250 million at a later time, unless the decrease in sales is material and permanent in nature.
274. In exceptional cases where total annual sales are not a meaningful indicator of group size and total assets is a more meaningful indicator, subject to the Supervisor's specific approval, total assets of the consolidated group may be substituted for annual sales turnover in calculating the SME threshold and the firm-size adjustment.

(iii) *Risk weights for specialized lending*

Risk weights for PF, OF, CF, and IPRE

275. Banking corporations that do not meet the requirements for the estimation of PD under the corporate IRB approach will be required to map their internal grades to five supervisory categories, each of which is associated with a specific risk weight. The slotting criteria on which this mapping must be based are provided in Appendix B. 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 banking corporations are expected to map their internal ratings to the supervisory categories for specialized lending using the slotting criteria provided in Appendix B, 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-	N/A

277. Banking corporations may lower the risk weights of “strong” exposures to 50% and of “good” exposures to 70%, provided they have a remaining maturity of less than 2.5 years.

278. Banking corporations that meet the requirements for the estimation of PD will be able to use the general foundation approach for the corporate asset class (FIRB) to derive risk weights for SL subclasses.

279. Banking corporations that meet the requirements for the estimation of PD, LGD, and/or EAD may use the general advanced approach (AIRB) for the corporate asset class to derive risk weights for SL subclasses.

Risk weights for HVCRE

280. Banking corporations 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 Appendix B. 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. Banking corporations may 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.

283–284. Canceled.

(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):

$$K_{DD} = K_0 * (0.15 + 160 * PD_g)$$

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.

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

PDo and PDg 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 is calculated according to the formula for correlation (R) in Paragraph 272 (or, if applicable, Paragraph 273), with PD being equal to PDo, and LGDg 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 banking corporation may recognize 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 PDo and PDg. 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.:

$$RWA_{DD} = K_{DD} * 12.5 * EAD_g$$

2. *Risk components*

(i) *Probability of default (PD)*

285. For corporate and bank exposures, the PD is the greater of the one-year PD associated with the internal borrower grade to which that exposure is assigned, or 0.03%. For sovereign exposures, the PD is the one-year PD associated with the internal borrower grade to which that exposure is assigned. The PD of

borrowers assigned to a default grade(s), consistent with the reference definition of default below, is 100%. The minimum requirements for the derivation of the PD estimates associated with each internal borrower grade are outlined in Paragraphs 461–463.

(ii) *Loss given default (LGD)*

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

LGD under the foundation approach

Treatment of unsecured claims and non-recognized collateral

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

288. All subordinated claims on corporates, sovereigns, and banks will be assigned a 75% LGD. A subordinated loan is a facility that is expressly subordinated to another facility. This Paragraph relates to subordination in the legal sense.

Collateral under the foundation approach

289. In addition to the eligible financial collateral recognized in the standardized approach (Proper Conduct of Banking Business Directive 203), under the foundation IRB approach some other forms of collateral, known as eligible IRB collateral, are also recognized. These include receivables, specified commercial and residential real estate (CRE and RRE, respectively), and other collateral, where they meet the minimum requirements set out in Paragraphs 509 to 524.⁷³ For eligible financial collateral, the requirements are identical to the operational standards set forth in Proper Conduct of Banking Business Directive 203, beginning with Paragraph 111.

⁷³ Deleted.

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 standardized approach in Paragraphs 147 to 181(i). The simple approach to collateral presented in the standardized approach will not be available to banking corporations that apply the IRB approach.
291. Following the comprehensive approach, the effective loss given default (LGD*) applicable to a collateralized transaction may 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 147–150 of Proper Conduct of Banking Business Directive 203. This concept is only used to calculate LGD*. Banking corporations must continue to calculate EAD without taking into account the presence of any collateral, unless otherwise specified.

$$LGD^* = LGD * \left(\frac{E^*}{E} \right)$$

292. Banking corporations that qualify for the foundation IRB approach may calculate E* using any of the ways specified under the comprehensive approach for collateralized transactions under the standardized approach (Proper Conduct of Banking Business Directive 203).
293. Where repo-style transactions are subject to a master netting agreement, a banking corporation may choose not to recognize the netting effects in

calculating capital. Banking corporations that want to recognize the effect of master netting agreements on such transactions for capital purposes must satisfy the criteria provided in Paragraphs 173 and 174 of the standardized approach (Proper Conduct of Banking Business Directive 203). The banking corporation must calculate E* in accordance with Paragraphs 176 and 177 of Proper Conduct of Banking Business Directive 203 and equate this to EAD. The impact of collateral on these transactions may not be reflected through an adjustment to LGD.

Carve-out from the comprehensive approach

294. Consistent with Paragraph 170 of Proper Conduct of Banking Business Directive 203, when the counterparty is a core market participant as specified in Paragraph 171, a banking corporation may apply a zero H to repo-style transactions provided it meets all threshold conditions. As for Paragraph 171, a list of entities that are recognized as core market participants has been determined.

Any change in Paragraphs 170 and 171 of Proper Conduct of Banking Business Directive 203 in respect to the standardized approach shall apply concurrently to the IRB approach.

Methodology for recognition of eligible IRB collateral

295. The methodology for determining the effective LGD under the foundation approach for cases where banking corporations 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 collateralization level for the exposure) would receive the appropriate LGD for unsecured exposures or those secured by collateral that 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** (the required level of over-collateralization for full LGD recognition) would be assigned an LGD according to the table below.

The following table displays the applicable LGD and required over-collateralization 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-collateralization for full LGD recognition (C**)
Eligible financial collateral	0%	0%	N/A
Receivables	35%	0%	125%
CRE/RRE	35%	30%	140%
Other collateral ⁷⁴	40%	30%	140%

- Senior exposures are to be divided into fully collateralized and uncollateralized portions.

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

- The part of the exposure considered fully collateralized, C/C**, receives the LGD associated with the type of collateral.
- The remaining part of the exposure is regarded as unsecured and receives an LGD of 45%.

Methodology for the treatment of pools of collateral

296. The methodology for determining the effective LGD of a transaction under the foundation approach, where banking corporations have taken both financial collateral and other eligible IRB collateral, is aligned to the treatment in the standardized approach (Proper Conduct of Banking Business Directive 203) and is based on the following guidance.

- In a case where a banking corporation has obtained multiple forms of collateral for CRM purposes, 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 banking corporation must divide the exposure into a portion covered by eligible financial collateral, a portion covered by receivables, a 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 recognizing the effect of eligible financial collateral and receivables collateral) is below the associated threshold level (i.e., the minimum degree of collateralization 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 Supervisor's specific approval, banking corporations may use their own internal estimates of LGD for corporate, sovereign, and bank exposures. LGD must be

measured as the loss given default as a percentage of the EAD. Banking corporations that qualify for the IRB approach but cannot meet these additional minimum requirements must apply the foundation LGD treatment described above.

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

Treatment of certain repo-style transactions

299. Banking corporations that wish to recognize 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. Banking corporations using the advanced approach may apply their own LGD estimates for the unsecured equivalent amount (E*).

Treatment of guarantees and credit derivatives

300. There are two approaches for recognition of CRM in the form of guarantees and credit derivatives in the IRB approach: a foundation approach for banking corporations using supervisory values of LGD, and an advanced approach for banking corporations 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, insofar as the CRM is recognized by the banking corporation, the adjusted risk weight will be no less than that of a comparable direct exposure to the protection provider. Consistent with the standardized approach (Proper Conduct of Banking Business Directive 203), banking corporations may choose not to recognize credit protection if doing so would result in a higher capital requirement.

Recognition under the foundation approach

302. For banking corporations using the foundation approach toward LGD, the approach to guarantees and credit derivatives closely follows the treatment under the standardized approach as specified in Paragraphs 189–201 of Proper Conduct of Banking Business Directive 203. The range of eligible guarantors is the same as under the standardized approach except that companies that are internally rated and associated with a PD equivalent to A- or better may also be recognized under the foundation approach. To receive recognition, the requirements outlined in Paragraphs 189–194 of Proper Conduct of Banking Business Directive 203 must be met.
303. Eligible guarantees from eligible guarantors will be recognized as follows:
- For the covered portion of the exposure, a risk weight is derived by weighting the following:
 - the risk-weight function appropriate to the type of guarantor, and
 - the PD appropriate to the guarantor’s borrower grade or, if the banking corporation deems a full substitution treatment not to be warranted, some grade between the underlying obligor and the guarantor’s borrower grade.
 - The banking corporation may replace the LGD of the underlying transaction with the LGD applicable to the guarantee, taking into account seniority and any collateralization of a guaranteed commitment.
304. The uncovered portion of the exposure is assigned the risk weight associated with the underlying obligor.
305. Where partial coverage exists, or where there is a currency mismatch between the underlying obligation and the credit protection, it is necessary to split the exposure into a covered and an uncovered amount. The treatment under the foundation approach follows that outlined in Paragraphs 198–200 of Proper Conduct of Banking Business Directive 203 (Standardized Approach) and depends upon whether the cover is proportional or tranced.

Recognition under the advanced approach

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

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

Operational requirements for recognition of double default

307(i). A banking corporation 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 banking corporation 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.

⁷⁵ When credit derivatives do not cover the restructuring of the underlying obligation, the partial recognition set out in Paragraph 192 of Proper Conduct of Banking Business Directive 203 applies.

- (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 applicable only where the following conditions are met.

- (a) The risk weight associated with the exposure before the application of the framework does not already factor in any aspect of the credit protection.
- (b) The entity selling credit protection is a bank,⁷⁶ an investment firm, or an insurance company (but only those that are in the business of providing credit protection, including mono-lines, re-insurers, and non-sovereign credit export agencies⁷⁷) that is referred to as a financial firm and that:
 - is regulated in a manner broadly equivalent to that in the Proper Conduct of Banking Business Directives in respect of capital adequacy (where there is supervisiion and transparency/market discipline) or is externally rated as at least investment grade by a credit rating agency deemed eligible as set forth in Paragraph 90 of Proper Conduct of Banking Business Directive 203;
 - 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.

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

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

- (c) The underlying obligation is:
- a corporate exposure as defined in Paragraphs 218–228 (excluding specialized-lending exposures for which the supervisory slotting criteria approach described in Paragraphs 275–282 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 Subparagraph (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 189–193 of Proper Conduct of Banking Business Directive 203.
- (f) In keeping with Paragraph 190 for guarantees, for any recognition of double-default effects for both guarantees and credit derivatives a banking corporation 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 banking corporation 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.
- (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 banking corporation intends to deliver an obligation other than the underlying exposure, it must ensure that the deliverable obligation is sufficiently liquid that the banking corporation would be able 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 banking corporation.
- (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 banking corporation 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 paragraphs 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 banking corporation'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 G.

Exposure measurement for on-balance-sheet items

309. On-balance-sheet netting of loans and deposits will be recognized subject to the same conditions as under the standardized approach (Paragraph 188 of Proper Conduct of Banking Business Directive 203). Where currency or maturity mismatched on-balance-sheet netting exists, the treatment follows the standardized approach, as set out in Paragraphs 200 and 202–205 of Proper Conduct of Banking Business Directive 203.

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 credit-conversion factor (CCF). There are two approaches for the estimation of CCFs: a foundation approach and an advanced approach.

EAD under the foundation approach

311. The types of instruments and the CCFs applied to them are the same as those in the standardized approach, as outlined in Paragraphs 82–89 of Proper Conduct of Banking Business Directive 203, 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 that are uncommitted, are unconditionally cancellable, or effectively provide for automatic cancellation, e.g., due to deterioration in a borrower's creditworthiness, at any time by the bank without prior notice. A CCF of 0% will be applied to these facilities.
313. The amount to which the CCF is applied is the lower of the value of the unused committed credit line and the value that reflects any possible constraining availability of the facility, such as the existence of a ceiling on the potential

lending amount that 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. Deleted.
315. Where a commitment is attributed to another off-balance-sheet exposure (e.g., a guarantee for an unutilized credit facility), banking corporations using the foundation approach shall apply the lower of the applicable CCFs.

EAD under the advanced approach

316. Banking corporations that meet the minimum requirements for the use of their own estimates of EAD (see Paragraphs 474–478) may use their own internal estimates of CCFs across different product types, provided the exposure is not subject to a CCF of 100% under the foundation approach (see Paragraph 311).

Exposure measurement for transactions that expose banking corporations to counterparty credit risk

317. Measures of exposure for SFTs and OTC derivatives that expose banking corporations to counterparty credit risk under the IRB approach will be calculated as per the rules set forth in Appendix C of Proper Conduct of Banking Business Directive 203.

(iv) *Effective maturity (M)*

318. For banking corporations 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.
319. Banking corporations using any element of the advanced IRB approach are required to measure effective maturity for each credit facility as defined below.

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 (with t measured in units of years).

- If a banking corporation is not in a position to calculate the effective maturity of the contracted payments as noted above, it is allowed to use a more conservative measure of M such as that it equals the maximum remaining time (in years) that the borrower is permitted to take to fully discharge its contractual obligation (principal, interest, and fees) under the terms of loan agreement. Normally, this will correspond to the nominal maturity of the instrument.
 - For derivatives subject to a master netting agreement, the weighted average maturity of the transactions should be used when applying the explicit maturity adjustment. Further, the notional amount of each transaction should be used for weighting the maturity.
321. The one-year floor does not apply to certain short-term exposures, comprising fully or nearly-fully collateralized⁷⁸ capital market-driven transactions (i.e., OTC derivatives transactions and margin lending) and repo-style transactions (i.e., repos/reverse repos and securities lending/borrowing) with an original maturity of less than one year, where the documentation contains daily

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

remargining clauses. For all eligible transactions the documentation must require daily revaluation, and must include provisions that must allow for the prompt liquidation or setoff of the collateral in the event of default or failure to re-margin. The maturity of such transactions must be calculated as the greater of one-day and the effective maturity (M, consistent with the definition above).

322. In addition to the transactions considered in Paragraph 321 above, other short-term exposures with an original maturity of less than one year that are not part of a bank's ongoing financing of an obligor may be eligible for exemption from the one-year floor. The types of short-term exposures that are eligible for this treatment are:

- Some capital market-driven transactions and repo-style transactions that might not fall within the scope of Paragraph 321;
- Some short-term self-liquidating trade transactions. Import and export letters of credit and similar transactions could be accounted for at their actual remaining maturity;
- Some exposures arising from settling securities purchases and sales. This may also include overdrafts arising from failed securities settlements provided that such overdrafts do not continue beyond 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 beyond a short, fixed number of business days; and
- Some exposures to banking corporations arising from foreign exchange settlements.

Clarifications:

- The list pertains only to short-term exposures that the banking corporation neither intends nor is legally required to roll over and will not roll over. When the banking corporation is in the habit (as determined on a cumulative statistical basis) of rolling over certain types of transactions in view of their business/industry/customer profile, even though it neither intends nor is

legally required to do so, then M will be equal to 1 (year). For the time being, the Supervisor does not see fit to establish a minimum for the statistical test. Such a determination will be considered if abuse of the discretion is found.

- Interbank on-call loans and deposits are current-financing instruments by nature; therefore, they are not included in this paragraph.
- A settlement proceeding is considered short-term if it ends within five business days at the most from the date of transaction origination.

323. For transactions falling within the scope of Paragraph 321 that are 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 of Proper Conduct of Banking Business Directive 203 will apply to the average, i.e., five, ten, or twenty days depending on the type of transaction. 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) to be 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 under the standardized approach—see Paragraphs 202–205 of Proper Conduct of Banking Business Directive 203.

D. Rules for Retail Exposures

326. Section D presents in detail the method of calculating UL capital requirements for retail exposures. Section D.1 provides three risk-weight functions, one for residential mortgage exposures, a second for qualifying revolving retail exposures, and a third for other retail exposures. Section D.2 presents the risk

components to serve as inputs to the risk-weight functions. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in Section G.

1. Risk-weighted assets for retail exposures

327. There are three separate risk-weight functions for retail exposures, as defined in Paragraphs 328–330. 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 in percent and EAD is measured in currency (e.g., NIS).

(i) Residential mortgage exposures

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

Correlation (R) = 0.15

Capital requirement (K) =

$$(K) = LGD * N \left[\sqrt{\frac{1}{1-R}} * G(PD) + \sqrt{\frac{R}{(1-R)}} * G(0.999) \right] - PD * LGD$$

Risk-weighted assets (RWA) = K * 12.5 * 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 banking corporation'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.

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

(ii) *Qualifying revolving retail exposures*

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

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

Capital requirement (K) =

$$(K) = LGD * N \left[\sqrt{\frac{1}{1-R}} * G(PD) + \sqrt{\frac{R}{(1-R)}} * G(0.999) \right] - PD * LGD$$

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

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 banking corporation'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 on the basis of the following function, which allows correlation to vary with PD:

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

Capital requirement

$$(K) = LGD * N \left[\sqrt{\frac{1}{1-R}} * G(PD) + \sqrt{\frac{R}{(1-R)}} * G(0.999) \right] - PD * LGD$$

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

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 banking corporation'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 Appendix A.

2. *Risk components*

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

331. For each identified pool of retail exposures, banking corporations 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 H. Additionally, the PD for retail exposures is the greater of the one-year PD associated with the internal borrower grade to which the pool of retail exposures is assigned or 0.03%.

(ii) *Recognition of guarantees and credit derivatives*

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

333. Consistent with the requirements outlined above for corporate, sovereign, and bank exposures, banking corporations must not include the effect of double default in such adjustments. The adjusted risk weight must be no less than that of a comparable direct exposure to the protection provider. Consistent with the standardized approach (Proper Conduct of Banking Business Directive 203), banking corporations may choose not to recognize 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 on-balance-sheet balances shall not

be less than the sum of (i) the amount by which a banking corporation'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 G.

335. On-balance-sheet netting of loans and deposits of a banking corporation to or from a retail customer will be permitted subject to the same conditions outlined in Paragraph 188 of Proper Conduct of Banking Business Directive 203. For retail off-balance-sheet items, banking corporations must use their own estimates of CCFs provided the minimum requirements in Paragraphs 474–477 and 479 are satisfied.
336. For retail exposures with uncertain future drawdown such as credit cards, banking corporations 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 banking corporation 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 banking corporation does not incorporate the possibility of additional drawings in its LGD estimates, it must do so in its EAD estimates.
337. When only the on-balance-sheet balances of retail facilities have been securitized, banking corporations must ensure that they continue to hold required capital against their share (i.e., the seller's interest) of the undrawn balances related to the securitized exposures using the IRB approach to credit risk. This means that for such facilities, banking corporations 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, undrawn balances of securitized exposures should be allocated between seller's and investors' interests on a pro-rata basis, based on the proportions of seller's and investors' shares of the securitized on-balance-sheet balances. The investors' share of off-balance-sheet balances related to the securitized exposures is subject to the treatment in Paragraph 643 of Proper Conduct of Banking Business Directive 205.

338. To the extent that foreign exchange and interest rate commitments exist within a banking corporation's retail portfolio for IRB purposes, banking corporations are not permitted to provide their internal assessments of credit equivalent amounts. Instead, the rules of the standardized approach (Proper Conduct of Banking Business Directive 203) shall continue to apply.

E. Rules for Equity Exposures

339. Section E presents the method of calculating the UL capital requirements for equity exposures. Section E.1 discusses (a) the market-based approach (which is further subdivided into a simple risk-weight method and an internal-models method) and (b) the PD/LGD approach. The risk components are provided in Section E.2. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in Section 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. This paragraph does not apply to immaterial equity holdings as defined in Paragraph 358, which are subject to the capital charges required under the standardized approach (Proper Conduct of Banking Business Directive 203).

342. Banking corporations must make their choice consistently and, in particular, must refrain from basing their choice on regulatory arbitrage considerations.

(i) *Market-based approach*

343. Under the market-based approach, banking corporations are permitted to calculate 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 banking corporation's equity holdings and commensurate with its size and the overall complexity of its activity. The Supervisor may require the use of either method based on the individual banking corporation's circumstances.

Simple risk-weight method

344. Under the simple risk-weight method, a 300% risk weight is applied to equity holdings that are publicly traded and a 400% risk weight is applied to all other equity holdings. A publicly traded holding is defined as any equity security traded on a recognized securities exchange as defined in Paragraph 146a of Proper Conduct of Banking Business Directive 203.

345. Short cash positions and derivative instruments held in the banking book are permitted to offset long positions in the same individual equities provided that these instruments have been explicitly designated as hedges of specific equity holdings and have remaining maturities of at least one year. Other short positions shall 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 applying to corporate exposures shall be used.

Internal models method

346. IRB banking corporations may use, or may be required by the Supervisor to use, internal risk-measurement models to calculate the risk-based capital requirement. Under this alternative, a banking corporation must hold capital equal to the potential loss on its equity holdings as derived from internal VaR (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 shall be incorporated into the banking corporation'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 shall 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 shall be calculated separately using the methodology of the simple risk-weight approach. Further, these minimum risk weights shall apply at the individual exposure level rather than at the portfolio level.
348. Where justified, a banking corporation may employ different market-based approaches to different portfolios based on appropriate considerations and where the banking corporation itself uses different approaches for its internal needs.
349. Banking corporations may recognize 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 toward equity exposures (including equities of companies included in the retail asset class) are the same as those for the IRB foundation approach (FIRB) for corporate exposures, subject to the following specifications⁸⁰:

- The banking corporation's estimate of the PD of a corporate entity in which it holds an equity position must satisfy the same requirements as the banking corporation's estimate of the PD of a corporate entity in which the banking corporation holds debt.⁸¹ If a banking corporation does not hold debt of the company in which it has made an equity investment and does not have sufficient information about the situation of the company to be able to use the applicable definition of default in practice but meets the other standards, a 1.5 scaling factor shall be applied to the risk weights derived from the corporate risk-weight function, given the PD set by the banking corporation. If, however, the banking corporation's equity holdings are material and it is permitted to use a PD/LGD approach for regulatory purposes but has not yet met the relevant standards, the simple risk-weight method under the market-based approach shall apply.
- In deriving the risk weight for equity exposures an LGD of 90% shall be assumed.
- For these purposes, the risk weight is subject to a five-year maturity adjustment whether or not the banking corporation uses the explicit approach to maturity elsewhere in its IRB portfolio.

351. Under the PD/LGD approach, the minimum risk weights set out in Paragraphs 352–353 shall 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

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

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

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% shall apply to 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 realized 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 banking corporation 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 banking corporation 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 realizing 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, banking

corporations 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 shall be treated as having a five-year maturity.

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

356–357. Deleted.

358. An IRB banking corporation may exclude its equity exposures from IRB treatment based of materiality. A banking corporation's equity exposures are considered material if their aggregate value exceeds, on average over the prior year, 10% of its Tier 1 plus Tier 2 capital. This materiality threshold is lowered to 5% of a banking corporation's Tier 1 plus Tier 2 capital if the equity portfolio consists of fewer than ten individual holdings.

2. *Risk components*

359. In general, the measure of an equity exposure on which the capital requirement is based is the value presented in the financial statements, which, depending on the generally accepted accounting and regulatory practices, may include unrealized 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 flowing not through income but into a tax-adjusted separate component of equity, exposure is equal to the fair value presented in the balance sheet.

- For investments held at cost or at the lower of cost or market, exposure is equal to the cost or market value presented in the balance sheet.⁸²

360. Holdings in funds containing both equity investments and other non-equity types of investments may 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 that attract the highest capital requirement, and then continues making investments in descending order until the maximum total investment level is reached. The same approach may also be used for the look-through approach, but only where the banking corporation has rated all the potential constituents of the fund in question.

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 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 F.2. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in Section G.

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

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 banking corporation can meet the qualification standards for this particular risk-weight function. For example, if a banking corporation cannot comply with the standards for qualifying revolving retail exposures (defined in Paragraph 234), it shall use the risk-weight function for other retail exposures. For hybrid pools containing mixtures of different exposure types, if the purchasing banking corporation cannot separate the exposures by type, it shall apply the risk-weight function that elicits the highest capital requirements for the exposure types in the receivable pool.

(i) Purchased retail receivables

364. For purchased retail receivables, a banking corporation must meet the risk quantification standards that apply to retail exposures but may utilize 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, i.e., irrespective of any assumption of recourse or guarantees from the seller or other parties.

(ii) Purchased corporate receivables

365. For purchased corporate receivables, the purchasing banking corporation is expected to apply the existing IRB risk quantification standards for the bottom-up approach. However, for eligible purchased corporate receivables and where the Banking Supervision Department permits, a banking corporation may use the following top-down procedure for calculating IRB risk weights for default risk:

- The purchasing banking corporation estimates the pool's one-year EL for default risk, expressed in percentage of the exposure amount (i.e., the total EAD amount to the banking corporation by all obligors in the receivables pool). The estimated EL must be calculated for the receivables on a stand-

alone basis, i.e., 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 on the basis of the risk-weight function for corporate exposures.⁸³ As described below, the precise calculation of risk weights for default risk depends on the banking corporation's ability to decompose EL into its PD and LGD components in a reliable manner. Banking corporations can utilize external and internal data to estimate PDs and LGDs. However, the advanced approach will not be available for banking corporations that use the foundation approach toward corporate exposures.

Foundation IRB treatment

366. If the purchasing banking corporation is unable to decompose EL into its PD and LGD components in a reliable manner, it shall determine the risk weight from the corporate risk-weight function using the following specifications: if the banking corporation can demonstrate that the exposures are exclusively senior claims to corporate borrowers, an LGD of 45% can be used. PD is calculated by dividing the EL using this LGD. EAD is calculated as the outstanding amount minus the capital charge for dilution prior to credit-risk mitigation ($K_{Dilution}$). Otherwise, PD is the banking corporation'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 banking corporation is able to estimate PD in a reliable manner, it shall determine the risk weight from the corporate risk-weight functions according to the specifications for LGD, M and the treatment of guarantees under the

⁸³ The firm-size adjustment for SMEs, as defined in Paragraph 273, is the weighted average by individual exposure of the pool of purchased corporate receivables. If the banking corporation does not have the requisite information to calculate the average size of the pool, the firm-size adjustment shall not apply.

foundation approach as specified in Paragraphs 287–296, 299, 300–305, and 318.

Advanced IRB treatment

367. If the purchasing banking corporation 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, it may estimate the other parameter on the basis of an estimate of the expected long-run loss rate. The banking corporation 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 recognize 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 is determined using the banking corporation’s estimated PD and LGD as inputs to the corporate risk-weight function. Similar to the foundation IRB treatment, 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} . Banking corporations using the advanced IRB approach may not use their internal EAD estimates for undrawn purchase commitments.
368. For drawn amounts, M equals the pool’s exposure-weighted average effective maturity (as defined in Paragraphs 320–324). This same value of M is also used for undrawn amounts under a committed purchase facility provided the facility contains effective covenants, early amortization triggers, or other features that protect the purchasing banking corporation 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 is

calculated as the sum of (a) the longest-dated potential receivable under the purchase agreement and (b) the remaining maturity of the purchase facility.

2. *Risk-weighted assets for dilution risk*

369. Dilution refers to the possibility that the receivable amount is reduced through cash or non-cash credits to the receivable's obligor.⁸⁴ For both corporate and retail receivables, unless the banking corporation can demonstrate to the Supervisor that the dilution risk for the purchasing banking corporation is immaterial, the treatment of dilution risk shall 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 banking corporation will estimate the one-year EL for dilution risk, also expressed in percentage of the receivables amount. Banking corporations can utilize external and internal data to estimate EL. As with the treatment of default risk, this estimate must be computed on a stand-alone basis, that is, under the assumption of no recourse or other support from the seller or third-party guarantors. For the purpose of calculating risk weights for dilution risk, the corporate risk-weight function must be used with the following settings: the PD must be set equal to the estimated EL, and the LGD must be set at 100%. An appropriate maturity treatment applies when determining the capital requirement for dilution risk. If the banking corporation can demonstrate that the dilution risk is appropriately monitored and managed in such a way that it is expected to be resolved within one year, the Supervisor may allow the banking corporation to apply a one-year maturity.

370. The banking corporation shall apply this treatment 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

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

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 of Proper Conduct of Banking Business Directive 205). Until a portion of such a purchase-price discount is refunded to the seller, the refundable amount shall be treated as first-loss protection within the IRB securitization framework (Proper Conduct of Banking Business Directive 205).

372. When collateral or partial guarantees obtained on receivables provide first-loss protection (collectively in this Paragraph: “mitigants”) and these mitigants cover default losses, dilution losses, or both, they may also be treated as first-loss protection under the IRB securitization framework (see Paragraph 629 of Proper Conduct of Banking Business Directive 205). When the same mitigant covers both default and dilution risk, banking corporations using the Supervisory Formula that are able to calculate an exposure-weighted LGD must do so as defined in Paragraph 634 of Proper Conduct of Banking Business Directive 205.

4. *Recognition of credit-risk mitigants*

373. Generally, credit-risk mitigants will be recognized using the same type of framework as set forth in Paragraphs 300–307.⁸⁵ In particular, a guarantee provided by the seller or a third party will be treated using the existing IRB rules for guarantees, regardless of whether the guarantee covers default risk, dilution risk, or both.

- If the guarantee covers both the pool’s default risk and its dilution risk, the banking corporation shall substitute the risk weight for an exposure to the guarantor in place of the pool’s total risk weight for default and dilution risk.

⁸⁵ Deleted.

- If the guarantee covers only default risk or dilution risk but not both, the banking corporation 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 the 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 PDo being equal to the estimated EL, LGDg being equal to 100 percent, and effective maturity being set according to Paragraph 369.

G. Treatment of expected losses and recognition of provisions

374. This section 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.

1. Calculation of expected losses

375. A banking corporation 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 securitization 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 securitization exposures is described in Paragraph 563 of Proper Conduct of Banking Business Directive 205.

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

376. Banking corporations must calculate an EL as $PD \times LGD$ for corporate, sovereign, bank, and retail exposures both not in default and not treated as hedged exposures under the double-default treatment. For corporate, sovereign, bank, and retail exposures that are in default, banking corporations must use their best estimate of expected loss as defined in Paragraph 471 and banking corporations on the foundation approach 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 $PD \times LGD$ unless Paragraphs 351–354 apply. Securitization exposures do not contribute to the EL amount, as set out in Paragraph 563 of Proper Banking Management Directive 205. 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%

When banking corporations lower the risk weight of the “strong” and “good” categories to 50% and 70%, respectively, given that the remaining term to

maturity is less than two and one-half years, 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 though banking corporations are allowed to assign preferential risk weights to HVCRE exposures in 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 securitization exposures must not be included in total eligible provisions.

(ii) Portion of exposures subject to the standardized approach to credit risk (Proper Conduct of Banking Business Directive 203)

381. Banking corporations using the standardized approach (Proper Conduct of Banking Business Directive 203) 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 standardized approach are immaterial (Paragraph 259), must determine the portion of general provisions

attributed to the standardized or IRB treatment of provisions according to the methods outlined in Paragraphs 382 and 383.

382. Banking corporations should generally attribute total general provisions on a pro-rata basis according to the proportion of credit-risk-weighted assets subject to the standardized approach (Proper Conduct of Banking Business Directive 203) and to the IRB approach. However, when one approach to determining credit risk-weighted assets (i.e., standardized or IRB) is used exclusively within an entity, general provisions booked within the entity using the standardized approach may be attributed to the standardized 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. Banking corporations using both the standardized approach (Proper Conduct of Banking Business Directive 203) and the IRB approach may rely on their internal methods for allocating general provisions for recognition in capital under either the standardized or IRB approach, subject to the following conditions. Generally, banking corporations must perform the relative allocation set forth in Paragraph 382. However, the Supervisor reserves the right to consider, on an individual basis, whether special circumstances exist that justify the use of the banking corporation's internal methods for allocation of the general provision between the two approaches for recognition of capital.

3. *Treatment of EL and provisions*

384. Banking corporations 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). When a banking corporation uses both the standardized approach (Proper Conduct of Banking Business Directive 203) and IRB under the standardized approach to credit risk, general provisions, as explained in Paragraphs 381–383, may be

included in Upper Tier 2 capital, as set forth in Proper Conduct of Banking Business Directive 202.

385. Where the calculated EL amount is lower than the provisions of the banking corporation, the Supervisor shall 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 securitization exposures is outlined in Paragraph 563 of Proper Conduct of Banking Business Directive 205.

H. Minimum requirements for IRB approach

387. Section H presents the minimum requirements for entry into and ongoing use of the IRB approach. The minimum requirements are set out in twelve separate subsections concerning: (a) composition of minimum requirements, (b) compliance with minimum requirements, (c) rating system design, (d) risk rating system operation, (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. Notably, 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 banking corporation must demonstrate to the 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 banking corporation's risk rating systems must fulfill. The focus is on banking corporations' ability to rate, order, and quantify risk in a consistent, reliable, and valid fashion.
389. The underlying 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 Supervisor recognizes that differences in markets, rating methodologies, banking products, and practical experience require banking corporations and the Supervisor to customize their operational procedures. It is not the Supervisor's intention to dictate the form or operational details of banking corporations' risk-management policies and procedures.
390. The minimum requirements set out in this Directive 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 the foundation and the advanced approaches unless noted otherwise. Generally, all IRB banking corporations must produce their own estimates of PD⁸⁶ and must adhere to the overall requirements for rating system design, operations, controls, and corporate governance, as well as the requisite requirements for estimation

⁸⁶ Banking corporations are not required to produce their own estimates of PD for certain equity exposures and certain exposures that fall within the SL subclass.

and validation of PD measures. Banking corporations wishing to use their own estimates of LGD and EAD must also meet the supplemental minimum requirements for these risk factors included in Paragraphs 468–489.

2. *Compliance with minimum requirements*

392. To be eligible for the IRB approach, a banking corporation must demonstrate to the Supervisor that it meets the IRB requirements in this document, at the outset and on an ongoing basis. The banking corporation’s overall credit-risk management practices must also be consistent with the evolving sound-practice guidelines issued by the Supervisor.

393. There may be circumstances when a banking corporation is not in full compliance with all the minimum requirements. Where this is the case, the banking corporation must produce a plan for a timely return to compliance and seek approval from the Supervisor, or must demonstrate that the effect of such non-compliance is immaterial in terms of the risk posed to the banking corporation. Failure to produce an acceptable plan or satisfactorily implement the plan or to demonstrate immateriality will lead the Supervisor to reconsider the banking corporation’s eligibility for the IRB approach. Furthermore, for the duration of any non-compliance, the Supervisor will consider the need for the banking corporation to hold additional capital under Proper Conduct of Banking Business Directive 211 (capital-adequacy assessment process) or take other supervisory action.

3. *Rating-system design*

394. The term “rating system” comprises all 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 banking corporation may utilize multiple rating methodologies/systems. For example, a banking corporation may have customized rating systems for specific industries or market segments (e.g., middle-market and large-corporate). If a banking corporation 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. Banking corporations must not allocate borrowers across rating systems inappropriately to minimize regulatory capital requirements (i.e., cherry-picking by choice of rating system). Banking corporations must demonstrate that each system used for IRB purposes is in compliance with the minimum requirements at the outset and on an ongoing basis.

(i) *Rating dimensions*

Standards for corporate, sovereign, and bank exposures

396. A qualifying IRB rating system must have two separate and distinct dimensions:

(i) the risk of borrower default and (ii) transaction-specific factors.

397. The first dimension must treat 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. First, in the case of country transfer risk, a banking corporation may assign different grades to a borrower depending on whether the facility is denominated in local or foreign currency. The second is when the treatment of guarantees associated 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 banking corporation must articulate in its credit policy the relationship between borrower grades in terms of the level of risk that 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. Foundation IRB banking corporations may fulfill this requirement by assuring the existence of a facility dimension that 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 banking corporations using the advanced approach, facility ratings must reflect LGD exclusively. These ratings may 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 insofar as they are predictive of LGD. Banking corporations may alter the factors that influence facility grades across segments of the portfolio as long as they can satisfy the Supervisor that the change improves the relevance and precision of their estimates.
400. Banking corporations using the supervisory slotting criteria for the SL subclass are exempt from this two-dimensional requirement for these exposures. Given the interdependence between borrower characteristics and transaction characteristics in SL, banking corporations 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 banking corporations using either the general corporate foundation or advanced approach for the SL subclass.

Standards for retail exposures

401. Rating systems for retail exposures must be oriented to both borrower and transaction risk and must capture all relevant borrower and transaction characteristics. Banking corporations must assign each exposure that falls within the definition of retail for IRB purposes to a particular pool. Banking corporations 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, banking corporations must estimate PD, LGD, and EAD. Multiple pools may share identical PD, LGD, and EAD estimates. At a minimum, banking corporations should consider the following risk drivers when assigning exposures to a pool:
- Borrower risk characteristics (e.g., borrower type, demographics such as age/occupation);
 - Transaction risk characteristics, including product and/or collateral types (e.g., LTV [loan to value] measures, seasonality, guarantees; and seniority [first vs. second lien]). Banking corporations must explicitly address cross-collateral provisions where present.
 - Delinquency of exposure: Banking corporations are expected to separately identify exposures that are delinquent and those that are not.

(ii) *Rating structure*

Standards for corporate, sovereign, and bank exposures

403. A banking corporation 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 banking corporation must have a minimum of seven borrower grades for non-defaulted borrowers and one for those that have

defaulted. Banking corporations with lending activities focused on a particular market segment may satisfy this requirement with the minimum number of grades; the Supervisor may require banking corporations that 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 qualify as distinct grades only if the banking corporation has developed complete rating descriptions and criteria for their assignment and separately quantifies PDs for these modified grades.
406. Banking corporations 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 falls within that band.
407. There is no specific minimum number of facility grades for banking corporations that use the advanced approach for estimating LGD. A banking corporation 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. Banking corporations using the supervisory slotting criteria for 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 banking corporation 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 banking corporation's total retail exposure.

(iii) Rating criteria

410. A banking corporation 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 banking corporation 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 or the Banking Supervision Department, to replicate rating assignments and evaluate the appropriateness of the grade/pool assignments.

- The criteria must also be consistent with the banking corporation’s internal lending standards and its policies for handling troubled borrowers and facilities.
411. To ensure that banking corporations consistently take available information into account, they must use all relevant and material information in assigning ratings to borrowers and facilities. Information must be current. The less information a banking corporation has, the more conservative its assignments of exposures to borrower and facility grades or pools must be. An external rating can be the primary factor determining an internal rating assignment; however, the banking corporation must ensure that it considers other relevant information.

SL product lines within the corporate-asset class

412. Banking corporations 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. Banking corporations must then map these internal rating grades into the five supervisory rating categories. Tables 1–4 in Appendix B provide, for each subclass 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 Supervisor realizes that the criteria that banking corporations use to assign exposures to internal grades will not perfectly align with criteria that define the supervisory categories. However, banking corporations must demonstrate that their mapping process has resulted in an alignment of grades that is consistent with the characteristics of the corresponding supervisory category. Banking corporations should take special care to ensure that any revision of their internal criteria does 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), banking corporations are expected to use a longer time horizon in assigning ratings.

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

416. Given the difficulties in forecasting future events and the influence they will have on a particular borrower's financial condition, a banking corporation must take a conservative view of projected information. Furthermore, where limited data are available, a banking corporation 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 to estimate 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 judgment 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 judgment 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 banking corporation to satisfy the 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 banking corporation is exposed and there must be no known material biases.
- The banking corporation must have in place a process for vetting data inputs into a statistical default or loss prediction model that includes an assessment of the accuracy, completeness, and appropriateness of the data specific to the assignment of an approved rating.
- The banking corporation must demonstrate that the data used to build the model are representative of the population of the banking corporation's actual borrowers or facilities.
- When model results are combined with human judgment, the judgment must take into account all relevant and material information not considered by the model. The banking corporation must have written guidance describing how human judgment and model results are to be combined.
- The banking corporation 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 banking corporation 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. Banking corporations must document in writing the design and operational details of their rating systems. The documentation must evidence banking corporations' 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 banking corporation 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 banking corporation 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 organization of rating assignment, including the internal control structure, must also be documented.
419. Banking corporations must document the specific definitions of default and loss used internally and demonstrate consistency with the reference definitions set out in Paragraphs 452–460.
420. If a banking corporation employs statistical models in the rating process, it 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 requirement for internal rating systems. The burden is on the model's vendor and the banking corporation to satisfy the Supervisor in this respect.

4. Risk rating system operations

(i) Coverage of ratings

422. For corporate, sovereign, and bank exposures, each borrower and all recognized 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 banking corporation is exposed must be separately rated. A banking corporation must have policies acceptable to the 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. For this purpose, a "legal entity" shall carry the definition of a "borrower" in Proper Conduct of Banking Business Directive 313 ("Limitations on the Indebtedness of a Borrower and a Group of Borrowers").

(ii) Integrity of rating process

Standards for corporate, sovereign, and bank exposures

424. Rating assignments and periodic rating reviews must be completed or approved by a party that does not directly stand to benefit from the extension of credit. Independence of the rating assignment process can be achieved through a range

of practices that will be carefully reviewed by the Supervisor. These operational processes must be documented in the banking corporation's procedures and incorporated into banking corporation 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, banking corporations must initiate a new rating if material information on the borrower or facility comes to light.
426. The banking corporation 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 of said information, the banking corporation needs to have a procedure to update the borrower's rating in a timely fashion.

Standards for retail exposures

427. A banking corporation 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 to ensure 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 judgment, banking corporations must clearly articulate the situations in which banking corporation 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 banking corporation must have guidelines and processes for monitoring cases where human judgment 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. Banking corporations must identify overrides and separately track their performance.

(iv) *Data maintenance*

429. A banking corporation 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 banking corporation to meet the other requirements in this document, and to serve as a basis for reporting to the Banking Supervision Department. These data should be sufficiently detailed to allow retrospective reallocation 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, banking corporations must collect and retain data on certain aspects of their internal ratings as required under the Reporting to the Public Directives.

For corporate, sovereign, and bank exposures

430. Banking corporations must maintain rating histories on borrowers and recognized 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. Banking corporations must also retain data on the PDs and realized default rates associated with rating grades and ratings migration in order to track the predictive power of the borrower rating system.
431. Banking corporations 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. Banking corporations must also collect data on the estimated and

realized LGDs and EADs associated with each defaulted facility. Banking corporations 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 or credit derivative. Information about the components of loss or recovery for each defaulted exposure must be retained, such as amounts recovered, source of recovery (e.g., collateral, liquidation proceeds and guarantees), time period required for recovery, and administrative costs.

432. Banking corporations under the foundation approach (FIRB) that utilize 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 realized losses for banking corporations using the supervisory slotting criteria for SL).

For retail exposures

433. Banking corporations 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. Banking corporations must also retain data on the estimated PDs, LGDs, and EADs associated with pools of exposures. For defaulted exposures, banking corporations must retain the data on the pools to which the exposure was assigned over the year prior to default and the realized outcomes on LGD and EAD.

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

434. An IRB banking corporation 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 unfavorable effects on a banking corporation's credit exposures and assessment of the banking corporation'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 banking corporation 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 shall be chosen by the banking corporation subject to approval by the Supervisor. The test to be employed must be meaningful and reasonably conservative. Individual banking corporations may develop different approaches to undertaking this stress test requirement, depending on their circumstances. For this purpose, the objective is not to require banking corporations to consider worst-case scenarios. The banking corporation'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 banking corporation's PDs, LGDs, and EADs, taking account—conservatively—of the banking corporation's international diversification.
- 435(i). Banking corporations 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. Banking corporations 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 it uses, the banking corporation must include a consideration of the following sources of information. First, a banking corporation's own data should allow estimation of the ratings migration of at least some of its exposures. Second, banking corporations should take account of information about the impact of a minor deterioration in the credit environment on their

ratings, with some consideration given to the likely effect of more acute stress circumstances. Third, banking corporations should evaluate evidence of ratings migration in external ratings. This should include the banking corporation's broadly matching its buckets to rating categories.

437. The Supervisor may wish to issue guidance to the banking corporations on how the tests to be used for this purpose should be designed, bearing in mind conditions in the jurisdiction. The results of the stress test may indicate no difference in the capital calculated under the IRB rules described in this Directive if the banking corporation already uses such an approach for its internal rating purposes. Where a banking corporation operates in several markets, it does not need to test for such conditions in all of those markets but it 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 banking corporation's board of directors or a designated committee thereof and senior management.⁸⁷ These parties must possess a general understanding of the banking corporation'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 in, or exceptions to, established policies that will materially impact the operations of the banking corporation'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 professional

⁸⁷ This standard refers to a management structure composed of a board of directors and senior management. In this Directive, the concepts of "board of directors" and "senior management" refer to two decision-making functions at banking corporation and not to legal frameworks.

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.

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 realized default rates (and LGDs and EADs for banking corporations 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. Banking corporations 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 banking corporation'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, the criteria, or the individual rating parameters must be documented and retained for the review of the Banking Supervision Department.

442. A credit risk control unit must actively participate in the development, selection, implementation, and validation of rating models. It shall be responsible to the Banking Supervision Department and to internal control entities for any models used in the rating process and shall bear ultimate responsibility for the ongoing review and adjustment of rating models.

(iii) *Internal and external audit*

443. Internal audit or an equally independent function must review at least annually the banking corporation'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. The Supervisor may also require an external audit of the banking corporation'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 allocation, and corporate governance functions of banking corporations using the IRB approach. Ratings systems and estimates developed and implemented exclusively for the purpose of qualifying for the IRB approach and used only to provide IRB inputs are not acceptable. It is recognized that banking corporations 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 such differences exist, a banking corporation must document them and demonstrate their reasonableness to the Supervisor.

445. A banking corporation must have a credible track record in the use of internal ratings information. Thus, it 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 banking corporation 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 banking corporation's rating system will not render a banking corporation 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 banking corporations using the IRB approaches must estimate a PD⁸⁸ for each internal borrower grade for corporate, sovereign, and bank exposures or, in the case of retail exposures, for each pool.

447. PD estimates must be a long-run average of one-year default rates for borrowers in the grade, with the exception of retail exposures (see below). Requirements specific to PD estimation are provided in Paragraphs 461–467. Banking corporations using the advanced approach must estimate an appropriate LGD (as defined in Paragraphs 468–473) for each of its facilities (or retail pools). Banking corporations using the advanced approach must also estimate an appropriate long-run default-weighted average EAD for each of its facilities as defined in Paragraphs 474 and 475. Requirements specific to EAD estimation appear in Paragraphs 474–479. For corporate, sovereign, and bank exposures, banking corporations 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 506–524.

448. Internal estimates of PD, LGD, and EAD must incorporate all relevant, material, and available data, information, and methods. A banking corporation may utilize internal data and data from external sources (including pooled data from shared

⁸⁸ Banking corporations are not required to produce their own estimates of PD for certain equity exposures and certain exposures that fall within the SL subclasses.

databases). Where internal or external data are used, the banking corporation 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 banking corporation's estimates must promptly reflect the implications of technical advances and new data and other information as they become available. Banking corporations must review their estimates on a yearly basis or more frequently.
450. The population of exposures represented in the data used for estimation, 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 banking corporation's exposures and standards. The banking corporation 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, banking corporations must take Paragraphs 468–479 into account. The number of exposures in the sample and the data period used for quantification must be sufficient to provide the banking corporation with confidence in the accuracy and robustness of its estimates. The estimation technique must also perform well in out-of-sample tests.
451. In general, estimates of PDs, LGDs, and EADs are likely to involve unpredictable errors. To avoid over-optimism, a banking corporation must add to its estimates a margin of conservatism that is derived from 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. The Supervisor may allow some flexibility in application of the standards for data that are collected prior to the date of implementation of this Directive. In such cases, however, banking corporations must demonstrate to the Supervisor that appropriate

adjustments have been made to achieve broad equivalence to the data without such flexibility. Data collected beyond the date of implementation must conform to the minimum standards unless otherwise stated.

Every banking corporation must make such adjustments as are required to establish a logically unbroken string of data in any situation where statistical series are disrupted. Such a disruption occurs when the significance of the data changes, i.e., on account of changes in legislation, standards, and so on. Also, upon request, a banking corporation must explain how it relates to and interprets historical data.

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

“Past due”—as per the definition of “past due debt” in the Definitions section (Section 1) of the Reporting to the Public Directive “Annual Financial Statement”, with the exception of “Overdraft Past Due,” which shall be treated in the manner described above in this section.

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

- The banking corporation puts the credit obligation on non-accrued status.

⁸⁹ Deleted.

- The banking corporation makes a charge-off or an account-specific provision resulting from a material decline in credit quality subsequent to the banking corporation taking on the exposure.⁹⁰
- The banking corporation sells the credit obligation at a material credit-related economic loss.
- The banking corporation consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.⁹¹

The expression “restructuring with forgiveness of debt” is equivalent to the expression “reorganization of troubled debt” as defined in the Definitions section (Section 1) of the Reporting to the Public Directive “Annual Financial Statement”. Such a debt should already be classified as in default at the stage of consent to restructuring, even if the restructuring has not yet been performed.

- The banking corporation 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. Deleted.

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 banking corporation to treat all other obligations to the banking group as defaulted.

⁹⁰ Deleted.

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

456. A banking corporation must record actual defaults on IRB exposure classes using the foregoing reference definition. A banking corporation must also use the reference definition for its estimation of PDs and (where relevant) LGDs and EADs. In arriving at these estimations, a banking corporation may use external data available to it that are not themselves consistent with that definition, subject to the requirements set out in Paragraph 462. In such cases, however, banking corporations must satisfy the Supervisor that appropriate adjustments to the data have been made to achieve broad equivalence with the reference definition. This same condition shall apply to any internal data used up to the implementation of this Directive. Internal data (including that pooled by banking corporations) used in such estimates beyond the date of implementation of this document must be consistent with the foregoing reference definition of default.

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

It is stated for clarity that the situation of “no trigger of the reference definition any longer applies” exists when there are no outstanding and unpaid components of principal or interest (amounts past due) on account of the exposure and the banking corporation expects full payback of outstanding principal and interest under the terms of the contract.

Restructured troubled debt, as defined in the Definitions section (Section 1) of the Reporting to the Public Directive “Annual Financial Statement”, may be removed from default status only if the conditions that allow it to be classified as interest-accruing debt (Paragraph 2.30.e of the Reporting to the Public Directive “Annual Financial Statement”) are present.

(iii) *Re-ageing*

458. The banking corporation 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 banking corporation 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). In addition to the foregoing conditions, re-ageing will be performed only if the delinquency is repaid in full, including accrued interest and penalties, or if the balance on account falls to within or under the approved facility. The topic will be rediscussed if indications of misuse of re-ageing are found.

(iv) *Treatment of overdrafts*

459. Authorized overdrafts shall be subject to a credit limit set by the banking corporation and brought to the knowledge of the client. Any breach of this limit must be monitored; if the account is not brought under the limit after 90 days, it shall be considered as defaulted. Non-authorized overdrafts will be associated with a zero limit for IRB purposes. Thus, days past due commence once any credit is granted to an unauthorized customer (i.e., from the first day on which such a customer's account is overdrawn). If such an exposure is not repaid within 90 days, it shall be considered in default. Banking corporations 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. Said measurement must include material discount effects and material direct and indirect costs associated with collecting on the exposure. Banking corporations must not simply measure the loss recorded in accounting records; they must also be able to compare accounting and economic losses. The banking corporation's own workout and collection expertise significantly influences its recovery rates and must be reflected in its LGD estimates, but adjustments to estimates for such expertise must be conservative until the banking corporation has sufficient internal empirical evidence of the impact of its expertise.

(vi) *Requirements specific to PD estimation*

Corporate, sovereign, and bank exposures

461. Banking corporations 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, banking corporations may use one or more of the three specific techniques set out below: internal default experience, mapping to external data, and statistical default estimation models.

462. Banking corporations may have a primary technique for PD estimation but may use additional techniques as a point of comparison and potential adjustment. The Supervisor will not allow the application of any particular technique without supporting analysis. Banking corporations must recognize the importance of judgmental considerations in combining results of techniques and in making adjustments for limitations of techniques and information.

- A banking corporation may use internal default experience in estimating PD. A banking corporation must demonstrate in its analyses 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 banking corporation must add a greater margin of conservatism in its estimates of PD. The use of pooled data across banking corporations may also be recognized, provided that the banking corporation demonstrates that the internal rating systems and criteria of the other banking corporations in the pool are comparable with its own.

- Banking corporations 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 banking corporation's grades. Mappings must be based on a comparison of internal rating criteria with 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 that underlie the data used for risk-weight quantification must be oriented to borrower risk and not reflect characteristics of the specific transaction. The banking corporation's analysis must include a comparison of the default definitions used, subject to the requirements in Paragraphs 452–457. The banking corporation must document the basis for the mapping.
- A banking corporation 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 banking corporation's use of default probability models for this purpose must meet the standards specified in Paragraph 417.

463. Irrespective of whether a banking corporation 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 the data culled are relevant and material, the data pertaining to this longer period must be used.

Retail exposures

464. Given the banking corporation-specific basis of assigning exposures to pools, banking corporations must regard internal data as the primary source of information for estimating loss characteristics. Banking corporations may use external data or statistical models for quantification provided a strong link can be demonstrated between (a) the banking corporation's process of assigning exposures to a pool and the process used by the external data source, and (b) between the banking corporation's internal risk profile and the composition of the external data. In all cases, banking corporations must use all relevant and material data sources in the 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 exposures shall be based on an estimate of the expected long-run loss rate. A banking corporation 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 recognize 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 banking corporations are using external, internal, pooled data sources, or a combination of the three for their estimation of loss characteristics, the length of the underlying historical observation period used must be at least five years. If the available observation spans a longer period for any source, and these data are relevant, this longer period must be used. A banking corporation need not give equal importance to historic data if it can convince the Supervisor that more recent data are a better predictor of loss rates.

467. Seasoning may have a material effect on long-term retail exposures and the effect may peak several years after origination. Banking corporations should anticipate and understand 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, banking corporations are also encouraged to adjust PD estimates upward for anticipated seasoning effects, provided such adjustments are applied in a consistent fashion over time.

A banking corporation, if so requested, must convince the Supervisor, on the basis of empirical data, that the seasonality effect is irrelevant to a particular subcategory in the portfolio. The Supervisor may instruct the banking corporation to use higher PD values for calculating capital insofar as he believes that the PD estimates are downward-biased due to seasonality.

(vii) Requirements specific to own-LGD estimates

Standards for all asset classes

468. A banking corporation must estimate an LGD for each facility separately. Said LGD should 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 on the basis of the average economic loss of all observed defaults within the data source for that type of facility. In addition, a banking corporation must take into account the potential for the LGD of the facility to be higher than the default-weighted average during a period when credit losses are substantially higher than average. For certain types of exposures, loss severities may not exhibit such cyclical variability and LGD estimates may not differ materially (if at all) from the long-run default-weighted average. For other exposures, however, this cyclical variability in loss severities may be important and banking corporations will need to incorporate it into their LGD estimates. For this purpose, banking corporations may use averages of loss severities observed during periods of high credit losses, forecasts based on

appropriately conservative assumptions, or other similar methods. Banking corporations may use either internal and/or external data to form appropriate estimates of LGD during periods of high credit losses.

469. In its analysis, the banking corporation must consider the extent of any dependency 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 banking corporation's assessment of LGD.
470. LGD estimates must be grounded in historical recovery rates and, when applicable, must not be based solely on the collateral's estimated market value. This requirement recognizes the potential inability of banking corporations both to gain control of their collateral and to liquidate it expeditiously. Insofar as LGD estimates take into account the existence of collateral, banking corporations must establish internal requirements for collateral management, operational procedures, legal certainty, and risk-management process that are consistent with those required for the standardized approach (Proper Conduct of Banking Business Directive 203).
471. Recognizing the principle that realized losses can at times systematically exceed expected levels, the LGD assigned to a defaulted asset should reflect the possibility that the banking corporation will have to recognize additional, unexpected losses during the recovery period. For each defaulted asset, the banking corporation 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 banking corporation's best estimate of expected loss on the asset represents the capital requirement for that asset, and should be set by the banking corporation on a risk-sensitive basis in accordance with Paragraphs 272 and 328–330. Instances where the best estimate of expected loss on a defaulted asset is less than the sum

of provisions and partial charge-offs on that asset, will attract the Supervisor's scrutiny and must be justified by the banking corporation.

Additional standards for corporate, sovereign, and bank exposures

472. Estimates of LGD must be based on a minimum data observation period that should ideally cover at least one complete economic cycle but must in any case be no shorter than a period of seven years for at least one information 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 banking corporation has, the more conservative its estimates must be. A banking corporation need not give equal importance to historic data if it can demonstrate to the 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 each type of facility upon default of the obligor. For on-balance-sheet items, banking corporations must estimate EAD at no less than the current drawn amount, subject to recognizing 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. Therefore, the additional minimum requirements for internal estimation of EAD under the advanced approach focus on the estimation of EAD for off-balance-sheet items (excluding transactions that expose banking corporations to counterparty credit risk as set out in Appendix C of Proper Conduct of Banking Business Directive 203). Advanced-approach banking corporations must have established procedures in place for the estimation of EAD for off-balance-sheet

items. Said procedures must specify the estimates of EAD to be used for each facility type. A banking corporation's estimates of EAD should reflect the possibility of additional drawings by the borrower up to and after the time a default event is triggered. Where estimates of EAD differ by facility type, the delineation of these facilities must be clear and unambiguous.

475. Advanced-approach banking corporations must assign an estimate of EAD to each facility. It must be an estimate of the long-run default-weighted average EAD for similar facilities and borrowers over a sufficiently long period of time, plus 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 banking corporation must use EAD estimates that are appropriate for an economic downturn, if these are more conservative than the long-run average. For banking corporations that have been able to develop their own EAD models, this may be achieved by considering the cyclical nature, if any, of the drivers of such models. Other banking corporations may have sufficient internal data to examine the impact of previous recession(s). However, some banking corporations may have only the option of making conservative use of external data.
476. The criteria by which estimates of EAD are derived must be plausible and intuitive, and represent what the banking corporation believes to be the material drivers of EAD. The choices must be supported by credible internal analysis by the banking corporation. The banking corporation must be able to provide a breakdown of its EAD experience by the factors it sees as the drivers of EAD. A banking corporation must use all relevant and material information in its derivation of EAD estimates. Across facility types, a banking corporation must review its estimates of EAD when material new information comes to light and at least on an annual basis.

477. The banking corporation must give due consideration to its specific policies and strategies adopted in respect of monitoring and control of accounts and payment processing. It 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. Banking corporations 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 banking corporation must be able to monitor outstanding balances on a daily basis.

477(i). For transactions that expose banking corporations to counterparty credit risk, estimates of EAD must fulfill the requirements set forth in Appendix C of Proper Conduct of Banking Business Directive 203.

Additional standards for corporate, sovereign, and bank exposures

478. Estimates of EAD must be based on a time period that should 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 information source and the data are relevant, the sample data pertaining to 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 banking corporation has, the more conservative its estimates must be. A banking corporation need not give equal importance to historic data if it can demonstrate to the Supervisor that more recent data are a better predictor of drawdowns.

(ix) *Minimum requirements for assessing effect of guarantees and credit derivatives
Standards for corporate, sovereign, and bank exposures where own estimates of LGD
are used and standards for retail exposures*

Guarantees

480. When a banking corporation uses its own estimates of LGD, it may reflect the risk-mitigating effect of guarantees by adjusting its PD or LGD estimates. The option to adjust LGDs is available only to those banking corporations that have been authorized to use their own internal estimates of LGD. For retail exposures, where guarantees exist, in support of either an individual obligation or a pool of exposures, a banking corporation may reflect the risk-reducing effect through its estimates of either PD or LGD, provided this is done consistently. In adopting one or the other technique, a banking corporation must adopt a consistent approach, both across the types of guarantees and over time.
481. In all cases, both the borrower and all recognized guarantors must be assigned a rating at the outset and on an ongoing basis. A banking corporation 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 honor its obligations. Consistent with the requirements in Paragraphs 430 and 431, a banking corporation must retain all relevant information about the borrower, irrespective of the guarantee, and about the guarantor. In the case of retail guarantees, these requirements also apply to the assignment of an exposure to a pool and to the estimation of PD.
482. In no case may a banking corporation assign a guaranteed exposure an adjusted PD or LGD such that the adjusted risk weight (RW) would be lower than that of a comparable direct exposure to the guarantor. The banking corporation may consider neither criteria nor rating processes that may have possible favorable effects of imperfect expected correlation between default events for the borrower and guarantor for purposes of regulatory minimum capital

requirements. The adjusted risk weight itself must not reflect the risk mitigation derived from “double default.”

Eligible guarantors and guarantees

483. There are no restrictions on types of eligible guarantors. The banking corporation must, however, have clearly specified criteria for the types of guarantors it will recognize for regulatory capital purposes.
484. The guarantee must be evidenced in writing, non-cancellable by the guarantor, in force until the debt is satisfied in full (up to 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 judgment. However, in contrast to the foundation approach toward corporate, bank, and sovereign exposures, guarantees prescribing conditions under which the guarantor may not be obliged to perform (conditional guarantees) may be recognized under certain conditions. Specifically, the onus is on the banking corporation to demonstrate that the assignment criteria adequately address any potential reduction in the risk-mitigation effect.

Adjustment criteria

485. A banking corporation 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 Directive.
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 banking corporation'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), banking corporations must take all relevant available information into account.

Credit derivatives

488. The minimum requirements for guarantees are also relevant 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 banking corporation must also consider the extent of the effect of residual risk.

For banking corporations using foundation LGD estimates

490. The minimum requirements outlined in Paragraphs 480–489 apply to banking corporations using the foundation LGD estimates, with the following exceptions:
- (1) the banking corporation 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. For any purchased receivables (corporate or retail), a banking corporation that applies a top-down approach to default risk and/or dilution risk must satisfy the following minimum requirements for risk quantification.
492. The purchasing banking corporation must 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 banking corporation regarding the quality of the underlying receivables, including data for similar pools provided by the seller, by the purchasing banking corporation, or by external sources. The purchasing banking corporation 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 ongoing quality of receivables purchased. Where expectations are not consistent, the purchasing banking corporation is expected to obtain and rely upon more relevant data.

Minimum operational requirements

493. A banking corporation purchasing receivables has to justify its 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 banking corporation will have to demonstrate the following:

Legal certainty

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

Effectiveness of monitoring systems

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

- The banking corporation 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 against such contingencies, including the assignment of an internal risk rating for each seller and servicer.
- The banking corporation must have clear and effective policies and procedures for determining seller and servicer eligibility. The banking corporation 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 appropriately documented.

- The banking corporation 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 banking corporation must have effective policies and procedures for monitoring on an aggregate basis single-obligor concentrations both within and across receivables pools.
- The banking corporation must receive timely and sufficiently detailed reports of receivables ageings and dilutions to (a) ensure compliance with its eligibility criteria and advancing policies governing purchased receivables and (b) provide an effective means with which to monitor and confirm the seller's terms of sale (e.g., invoice-date ageing) and dilution.

Effectiveness of work-out systems

496. An effective program 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 proactively. In particular,

- The banking corporation 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-amortization triggers, etc.) as well as (b) the banking corporation's internal policies governing advance rates and receivables eligibility. The banking corporation's systems should track covenant violations and waivers as well as exceptions to established policies and procedures.
- To limit inappropriate draws, the banking corporation should have effective policies and procedures for detecting, approving, monitoring, and correcting over-advances.
- The banking corporation 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 toward 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 banking corporation 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 program, including 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 banking corporation's internal policies and procedures

498. Given the reliance on monitoring and control systems to limit credit risk, the banking corporation 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 banking corporation's receivables purchase program.
- 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 banking corporation'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. Banking corporations 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 banking corporation must demonstrate to the Supervisor that the internal validation process enables it to assess the performance of internal rating and risk estimation systems consistently and meaningfully.
501. Banking corporations must regularly compare realized default rates with estimated PDs for each grade and be able to demonstrate that the realized default rates are within the expected range for that grade. Banking corporations 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 cover as long a period as possible. The banking corporation must clearly document the methods and data that it uses in such comparisons. This analysis and documentation must be updated at least annually.
502. Banking corporations 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. Banking corporations' 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. Banking corporations 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. Banking corporations must have well-articulated internal standards for situations where deviations in realized 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 realized values continue to exceed expected values, banking corporations must revise estimates upward to reflect their default and loss experience.

505. Where banking corporations rely on supervisory, rather than internal, estimates of risk parameters, they are encouraged to compare realized LGDs and EADs to those set by the Supervisor. The data on realized LGDs and EADs should form part of the banking corporation's assessment of economic capital.

9. *Supervisory LGD and EAD estimates*

506. Banking corporations that use the foundation IRB approach and do not meet the foregoing requirements for own-estimates of LGD and EAD must meet the minimum requirements described in the standardized approach to receive recognition for eligible financial collateral (as set out in Chapter D of Proper Conduct of Banking Business Directive 203 concerning credit-risk mitigation). They must meet the following additional minimum requirements in order to receive recognition for additional collateral types.

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

507. Eligible CRE and RRE collateral for corporate, sovereign, and banking corporation 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 that serves as collateral⁹²; and

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

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

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

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

- Legal enforceability: any claim on a collateral taken must be legally enforceable in all relevant jurisdictions, and any claim on collateral must be properly filed on a timely basis. Collateral interests must reflect a perfected lien (i.e., all legal requirements for establishing the claim have been fulfilled). Furthermore, the collateral agreement and the legal process underpinning it must be such that they provide for the banking corporation to realize 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 banking corporation 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

⁹² Deleted.

⁹³ Deleted.

(e.g., reference to housing price indices, sampling) may be used to update estimates or 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: Banking corporations may take junior liens into account only where (1) there is no doubt that the claim for collateral is legally enforceable and (2) the lien constitutes an efficient credit-risk mitigant. When recognized, junior liens are to be treated using the C*/C** threshold that applies to senior liens. In such cases, the sum of the junior lien and all more senior liens shall be taken into account in calculating the C* and C**.⁹⁴

510. Additional collateral management requirements are as follows:

- The types of CRE and RRE collateral accepted by the banking corporation and lending policies (advance rates) when this type of collateral is taken must be clearly documented.
- The banking corporation must take steps to ensure that the property taken as collateral is adequately insured against damage or deterioration.
- The banking corporation must monitor on an ongoing basis the extent of any permissible prior claims (e.g., tax) on the property.
- The banking corporation 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

⁹⁴ Deleted.

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 securitizations, subparticipations, 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 to the proceeds of the collateral.
513. Banking corporations must take all steps necessary to fulfill local requirements in respect of the enforceability of security interest, e.g., by registering a security interest with a registrar. There should be a framework that allows the potential lender to have a perfected first priority claim over the collateral.
514. All documentation used in collateralized transactions must be binding on all parties and legally enforceable in all relevant jurisdictions. Banking corporations must have conducted sufficient legal review to verify this, have a well founded legal basis to reach this conclusion, and undertake such further review as is necessary to ensure continuing enforceability.
515. The collateral arrangements must be properly documented, including a clear and robust procedure for the timely collection of collateral proceeds. Banking corporations' procedures should ensure that any legal conditions required for declaring the default of the customer and timely collection of collateral are satisfied. In the event of the obligor's financial distress or default, the banking corporation should have legal authority to sell or assign the receivables to other parties without consent of the obligor.

Risk management

516. The banking corporation must have a valid process for determining the credit risk in the receivables portfolio. 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 banking corporation relies on the borrower to ascertain the credit risk of the borrower's customers, the banking corporation 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 cost of collection, concentration within the receivables pool pledged by an individual borrower, and potential concentration risk within the banking corporation's total exposures.
518. The banking corporation must maintain a continuous monitoring process that is appropriate to the specific exposures (either immediate or contingent) attributable to the collateral to be utilized as a risk mitigant. This process may include, where 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 event that a small number of large-sized receivables are taken as collateral. Observance of the banking corporation'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 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) shall not be recognized as risk mitigants.
520. The banking corporation should have a documented process for the collection of receivable payments in distressed situations. The requisite facilities for collection should be in place even when the banking corporation normally looks to the borrower for collection.

Requirements for recognition of other collateral

521. Physical collateral may include motor vehicles.
- The Supervisor may allow recognition of the credit risk mitigating effect of certain other physical collateral. The Supervisor's decision will depend on compliance with the following two standards:
- the existence of liquid markets for disposal of collateral in an expeditious and economically efficient manner;
 - the existence of well established, publicly available market prices for the collateral and the existence of reasonable grounds for the assumption that the amount the banking corporation will receive when realizing the collateral will not deviate significantly from these market prices.
522. For a given banking corporation to receive recognition for the additional physical collateral set forth in Paragraph 521, it must meet all the standards specified in Paragraphs 509 and 510, subject to the following modifications.

- First claim: only first liens on, or charges over, collateral may be recognized. As such, the banking corporation must have priority over all other lenders to the realized proceeds of the collateral.
- The loan agreement must include detailed descriptions of the collateral plus detailed specifications of the manner and frequency of revaluation.
- The types of physical collateral accepted by the banking corporation 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.
- Banking corporation credit policies with regard to 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 on account of fashion, or model-year, obsolescence as well as physical obsolescence or deterioration.
- In cases of inventories (e.g., raw materials, work-in-process, finished goods, dealers’ inventories of autos) and equipment, the periodic revaluation process must include physical inspection of the collateral.

10. *Requirements for recognition of leasing*

523. Leases other than those that expose the banking corporation to residual-value risk (see Paragraph 524) shall be accorded the same treatment as exposures collateralized by the same type of collateral. The minimum requirements for the collateral type (CRE/RRE or other) must be met. In addition, the banking corporation 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 its 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 amortization of the lease payments must not be so large as to overstate the CRM attributed to the leased assets.

524. Leases that expose the banking corporation to residual-value risk (the banking corporation's exposure to potential loss due to the fair value of the equipment declining below its residual estimate at lease inception) shall be treated in the following manner:

- The banking corporation shall give the discounted lease payment stream a risk weight appropriate for the lessee's financial strength (PD) and in accordance with a supervisory or own estimate of LGD, whichever is appropriate.
- The residual value shall 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 banking corporation must demonstrate to the Supervisor that it meets certain quantitative and qualitative minimum requirements at the outset and on an ongoing basis. A banking corporation that fails to demonstrate continued compliance with the minimum requirements must develop a plan for rapid return to compliance, obtain the Supervisor's approval of the plan, and implement the plan in accordance with the schedule set forth. In the interim, banking corporations are expected to compute capital charges using the simple risk-weight approach.

526. The Supervisor recognizes that differences in markets, measurement methodologies, equity investments, and management practices require banking corporations to customize their operational procedures. It is not the Supervisor's intention to dictate the form or operational detail of banking corporations' risk-management policies and measurement practices for their banking-book equity holdings. However, some of the minimum requirements are specific.

(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 banking corporation'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 banking corporation'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 banking corporation'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. Banking corporations must demonstrate to the Supervisor 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 banking corporation'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 banking corporation must combine empirical analysis of the 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 for the estimation of potential quarterly losses, banking corporations may use quarterly data or convert shorter-horizon period data into 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, banking corporations 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 material risks embodied in equity returns, including both the general market risk and the specific risk exposure of the banking corporation'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 banking corporation's equity exposures.
- (d) Banking corporations may also use modelling techniques such as historical scenario analysis to determine minimum capital requirements for banking-book equity holdings. Such models may be used only if the banking corporation demonstrates to the Supervisor that the

methodology and its output can be quantified in loss percentile terms as specified in Subparagraph (a) above.

- (e) Banking corporations must use an internal model that is appropriate for the risk profile and complexity of their equity portfolio. A banking corporation that has 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 the Supervisor's approval, equity portfolio correlations can be integrated into a banking corporation's internal risk measures. The use of explicit correlations (e.g., utilisation of a variance/covariance VaR model) must be fully documented and supported by empirical analysis. The appropriateness of implicit correlation assumptions will be evaluated by the Supervisor in his/her 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, on the basis of both theoretical and empirical evidence, demonstrated to be appropriate for the specific holdings. Where professional judgment is combined with quantitative techniques in estimating the return volatility of a holding, the judgment must take into account the relevant and material information not considered by the other techniques utilized by the banking corporation.
- (h) Where factor models are used, either single or multi-factor models are permissible depending upon the nature of a banking corporation's holdings. Banking corporations 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 (e.g., public, private, market capitalization in industry sectors and subsectors, operational characteristics) in which the banking

corporation holds significant positions. While banking corporations will have discretion in choosing the factors, they must demonstrate through empirical analyses the appropriateness of these 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 banking corporation may utilize 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 banking corporation with confidence in the accuracy and robustness of its estimates. Banking corporations 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 program must be in place. Banking corporations 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. Banking corporations' overall risk-management practices used to manage their banking-book equity investments should be consistent with the Supervisor's guidelines. With regard to the development and use of internal models for capital purposes, banking corporations must have established policies, procedures, and controls to ensure the integrity of the model and the process used to calculate capital requirements. These policies, procedures, and controls should include the following:

- (a) Full integration of the internal model into the banking corporation’s overall management information systems and the management of its banking-book investment 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 risk-adjusted performance); and (iii) allocating economic capital to equity holdings and evaluating overall capital adequacy, or taking action within the framework of the supervisory review process (Proper Conduct of Banking Business Directive 211). The banking corporation should be able to demonstrate—through, for example, the minutes of its investment committee—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 workplans, 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) The 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 supervisory 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 Supervisor.

Validation

530. Banking corporations must have a robust system in place to validate the accuracy and consistency of their internal models and modelling processes. A banking corporation must demonstrate to the Supervisor that the internal validation process enables it to assess the performance of its internal model and modelling processes consistently and meaningfully.

531. Banking corporations must regularly compare actual return performance (computed using realized and unrealized 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 cover as long a period as possible. The banking corporation must clearly document the methods and data that it uses in such comparisons. This analysis and documentation should be updated at least annually.

532. In addition to the foregoing, banking corporations should make use of other quantitative validation tools and comparisons with external data sources. The analyses should be based on data that are appropriate to the portfolio, are updated regularly, and cover a relevant observation period. Banking corporations' internal assessments of the performance of their own model must be based on long data histories and must cover a range of economic conditions, ideally one or more complete business cycles.
533. Banking corporations 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 as against expected performance over time serves banking corporations as a basis for the ongoing refinement and adjustment of their internal models, banking corporations using internal models are expected to 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 banking corporation's model review standards.
535. To facilitate model validation through backtesting on an ongoing basis, banking corporations 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 from their internal models. Banking corporations should also backtest the volatility estimates used within their internal-models and the appropriateness of the proxies used in the model.

The Supervisor may ask banking corporations 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 banking corporation to satisfy the Supervisor that a model has good predictive power and that its use will not distort the regulatory capital requirements. Accordingly, all critical elements of an internal model and the modelling process should be fully and adequately documented. Banking corporations must document in writing their internal model's design and operational details. The documentation should demonstrate banking corporations' 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 banking corporation 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 banking corporation'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 banking corporation 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 banking corporation's internal review standards, the banking corporation must document that these changes are consistent with its internal model review standards.
- (b) In documenting their internal models, banking corporations 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, banking corporations must have performed and documented a rigorous analysis demonstrating that all chosen proxies and mappings are sufficiently representative of the risks 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, and 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;
 - derived from 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,
 - robust estimates of the potential risk of the underlying holding.

12. Disclosure requirements

537. To be eligible for the IRB approach, banking corporations must meet the disclosure requirements set out in the Reporting to the Public Directives. These are the minimum requirements for use of IRB; failure to meet them will render banking corporations ineligible to use the relevant IRB approach.

Appendix A

Illustrative IRB Risk Weights

1. The following tables provide illustrative risk weights calculated for four asset-class types under the internal-ratings-based (IRB) approach to credit risk. Each set of risk weights for unexpected loss (UL) was produced using the appropriate risk-weight function of the risk-weight functions set out in this Directive. The input data used to calculate the illustrative risk weights include measures of the PD, LGD, and an assumed effective maturity (M) of 2.5 years.
2. A firm-size adjustment is applied to exposures to small- and medium-sized entity (SME) borrowers (defined as corporate exposures where the reported sales for the consolidated group of which the firm is a part are less than NIS 250 million). Accordingly, a firm-size adjustment was made in determining an additional set of risk weights, shown in Column 2, given that the reported annual sales turnover of the consolidated group to which the firm belongs is assumed to be NIS 25 million.

Illustrative IRB Risk Weights for UL

Asset class	Corporate exposures		Residential mortgage exposures		Other retail exposures		Qualifying revolving retail exposures	
	45%	45%	45%	25%	45%	85%	45%	85%
LGD								
Maturity	2.5 years							
Turnover (NIS million)	250	25						
PD:								
0.03%	14.44%	11.30%	4.15%	2.30%	4.45%	8.41%	0.98%	1.85%
0.05%	19.65%	15.39%	6.23%	3.46%	6.63%	12.52%	1.51%	2.86%
0.10%	29.65%	23.30%	10.69%	5.94%	11.16%	21.08%	2.71%	5.12%
0.25%	49.47%	39.01%	21.30%	11.83%	21.15%	39.96%	5.76%	10.88%
0.40%	62.72%	49.49%	29.94%	16.64%	28.42%	53.69%	8.41%	15.88%
0.50%	69.61%	54.91%	35.08%	19.49%	32.36%	61.13%	10.04%	18.97%
0.75%	82.78%	65.14%	46.46%	25.81%	40.10%	75.74%	13.80%	26.06%
1.00%	92.32%	72.40%	56.40%	31.33%	45.77%	86.46%	17.22%	32.53%
1.30%	100.95%	78.77%	67.00%	37.22%	50.80%	95.95%	21.02%	39.70%
1.50%	105.59%	82.11%	73.45%	40.80%	53.37%	100.81%	23.40%	44.19%
2.00%	114.86%	88.55%	87.94%	48.85%	57.99%	109.53%	28.92%	54.63%
2.50%	122.16%	93.43%	100.64%	55.91%	60.90%	115.03%	33.98%	64.18%
3.00%	128.44%	97.58%	111.99%	62.22%	62.79%	118.61%	38.66%	73.03%
4.00%	139.58%	105.04%	131.63%	73.13%	65.01%	122.80%	47.16%	89.08%
5.00%	149.86%	112.27%	148.22%	82.35%	66.42%	125.45%	54.75%	103.41%
6.00%	159.61%	119.48%	162.52%	90.29%	67.73%	127.94%	61.61%	116.37%
10.00%	193.09%	146.51%	204.41%	113.56%	75.54%	142.69%	83.89%	158.47%
15.00%	221.54%	171.91%	235.72%	130.96%	88.60%	167.36%	103.89%	196.23%
20.00%	238.23%	188.42%	253.12%	140.62%	100.28%	189.41%	117.99%	222.86%