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GUIDE TO SUPERVISORY ACTIVITIES

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PART 2

PROCEDURES FOR OFF-SITE MONITORING

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The Italian text alone is authentic.

FOREWORD

The reference criteria for supervisory activities and corrective measures, for carrying out the main administrative procedures and for the recognition of “internal systems" used by intermediaries for calculating capital requirements are systematically described in Part 2 of this Guide, coherently with the supervisory processes and instruments presented in Part 1.

Both Parts are inspired by the same principles: focus on risks, consolidated approach, proportionality. The complexity and high integration of financial markets call for selectivity and careful gradation of the analysis and intervention stages.

The connection between assessments, response to intermediaries’ applications and supervisory actions is strong. Their consistency – the cornerstone of supervision – takes advantage of the six-level articulation of assessments. Off-site and on-site evaluations thus lead to a coherent policy on supervised entities using the most appropriate means to achieve supervisory objectives, thus enhancing the importance of the dialogue with the corporate officers.

The activities dealing with the analysis and evaluation of the intermediaries' situation are neatly separated from those dealing with actions and authorizations, in order to (i) immediately grasp any symptoms of deterioration, (ii) accurately assess the effectiveness of the intermediaries' initiatives, (iii) promptly act to prevent the deterioration of a sound and prudent management, thus guaranteeing the pursuit of the legal objectives of Supervision, (iv) strengthen the independence of the various steps of the prudential review and evaluation process, to ensure the full objectivity of supervisory actions, and (v) support the integration of the technical analysis' findings with the whole of the relevant evaluation elements.

The use of technical discretion – intended to safeguard the effectiveness of supervision – is made compatible with the guaranties granted to the supervised entities, i.e. transparency, motivation and consistency of the administrative action, minimization of burden for intermediaries.

The implementation of the aforementioned principles requires objectivity of evidence, strength of reasoning, clarity of purpose while respecting the intermediaries' independence, consistency between seriousness of deficiencies and intensity of corrective actions.

In pursuing these needs, Part 2 of this Guide is based on a pragmatic approach. No rigid patterns of conduct are set, due to the difficulty of modeling the full range of business situations created by the incessant development of financial and technological innovation, the emergence of

new risks (including systemic ones), the development of innovative business models.

Thus, the guidelines provided are intended to orient the resolution of problems and have to be adapted to the observed cases. Compliance with prudential rules, adequacy of governance and control systems, effectiveness and reliability of safeguards against risks, availability of adequate capital resources are the essential yardsticks for selecting the supervisory actions; they are all summarized in the judgments resulting from the Evaluation Cycle.

In a purely procedural perspective, the impact of supervision on the intermediaries' activities requires of supervisory staff the strict observance of regulations and, in particular, of deadlines for the conclusion of procedures.

SECTION I

SUPERVISORY ACTIVITIES AND CORRECTIVE MEASURES

CONTENTS

CHAPTER I
Supervisory activities: principles, objectives, instruments

I.1 Foreword

The Risk Assessment System – RAS (see Part 1, Section I, par. II.5) is the basis for supervisory activities. It is directed at analyzing individual risks or cross-cutting issues as well as the overall situation.

The supervisory activity varies significantly depending on the specific situations observed and is constantly adapted to them. It can be broken down into the following logical categories, which may however turn out to be closely related.

In particular:

- fact-finding activities are aimed at expanding the information available (and the related assessments) with more detailed qualitative and quantitative elements on the intermediaries' situation (governance and control structures, business strategies, risk profiles, etc.), including thematic analyses for macro-prudential purposes; such action mainly hinges on the interaction with intermediaries (see par. I.6) and is implemented by various means (requests for information, meetings, inspections); in general, it does not determine requests for adjustments to the operations or organization;
- corrective measures that – depending on the situation – are directed at preventing the deterioration of the corporate situation or any of its aspects, stimulate the corporate bodies to maintain or restore normal conditions, promote the reorganization of deteriorated businesses, ensure compliance with rules and regulatory requirements. They are carried out through "measures", formal acts of the Supervision to:
  - state warnings, requests or advice (preventive measures);
  - request intermediaries to adopt corrective measures on organization, risk or capital (corrective measures);
- "follow-up" actions aim to monitor the state of implementation of plans set out by intermediaries – on their own initiative or to meet a request by the Supervision – also taking account of developments in the operations and the corporate situation. These actions may determine changes in the nature or intensity of interventions, to adjust them to new needs.

In order to guarantee the effectiveness of supervisory actions, it is essential to accurately identify the ultimate goals and the most appropriate instruments; the most important benchmark is the result of the Evaluation Cycle.

The selection of supervisory measures is influenced by the intermediary's size and specific problems (proportionality principle); due to the fact the Analysis Schemes are based on a consolidated approach, the intermediary's affiliation to a group is also relevant.

I.2 Principle of the "evaluation-measure" link

The way supervisory measures are designed and implemented must be consistent with the findings of on- and off-site monitoring, analysis and evaluation activities.

To this end, the main criteria to determine supervisory measures depending on the assigned scores are described below. Moreover, in light of the specificities characterizing the actual cases, it is impossible to set pre-determined links between evaluations and measures, i.e. to univocally establish in advance type, ways and means of the actions to be carried out.

Such criteria must be constantly adjusted to the actual situations, also taking account of past actions, achieved results, corporate bodies' attitude to problem resolution, foreseeable developments in the firm's situation and risks of its deterioration.

It is therefore the supervisory units' task to determine, case-by-case, the contents of the most appropriate actions.

I.2.1 General guidelines for supervisory measures

A. Area of positive scores

Overall scores 1 and 2

The periodical monitoring of the intermediaries' situation is usually integrated by a fact-finding action on the entity's most sensitive aspects (ICAAP report; innovative strategies; technical aspects that, although stable, show signs of deterioration, etc.).

The action methodologies are based on a continuous dialogue with intermediaries, using the most effective instrument for the result to be achieved.

Overall score 3

Actions mainly concern the aspects showing weaknesses (whose scores fall within the area of negative evaluations). Both the periodical monitoring and the fact-finding action should be more extensive where "alarm-level" overall and/or profile-specific scores indicate risks of deterioration or mark a worsening of previous evaluations. The dialogue with intermediaries is intended to ascertain the real extent of weaknesses, the adequacy of corrective measures adopted, the suitability of strategies, especially if these are targeted at expanding operations or entering into new business segments.

The analysts determine the opportunity of initiatives aimed at preventing deteriorations in the technical and organizational profiles which could evolve in pathology ("preventive actions"); this is normally accomplished by prodding and sensitizing the corporate bodies: warnings or recommendations concerning the profiles characterized by negative evaluations are issued in the way deemed most effective.

B. Area of negative evaluations

Overall score 4

Close monitoring is necessary, as a negative evolution of the technical and organizational situation might dent – or even irreparably compromise – the intermediary's stability.

Periodical checks gain top priority; their accuracy is increased and, if necessary, their frequency is above average. They must mainly cover the problem areas and any violations of rules.

The analysts decide whether to request ad hoc data and information – also at regular intervals – for a better assessment of those aspects (for example, details of the development of problem assets found during inspections, reports by the control functions).

Closer examinations also aim to test the awareness of managers, their ability to identify and implement corrective measures, the effectiveness (in terms of objectives, timing, and modes) of any initiative undertaken independently. In this regard, the instruments most appropriate for the situation should be used (letters, meetings with the management, on-site inspections).

Lacking an autonomous and effective remedial action – possibly as a consequence of unsuccessful previous interventions – corrective measures should be implemented, gradually adjusting their progression and intensity to the problems identified [1].

Since the overall score stems from the summary of profile evaluations, corrective measures may concern, along with the situation of the intermediary, specific or cross-cutting risk areas. Moreover, it is important to consider which risk area components (quantitative and/or qualitative) show the most serious problems, in order to calibrate the intervention accordingly [2].

Overall scores 5 and 6

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1 In most cases, these are interventions aimed at strengthening systems, procedures and processes.

2 For example, measures to improve risk management systems and processes should be taken to address the weaknesses emerged – in one or more risk areas – in purely managerial and organizational profiles.

Intermediaries with specific problems shall be subject to very incisive actions, through intensified and very frequent controls and, usually, corrective measures envisaged in regulations.

All these interventions may deal with organizational issues (corporate governance, internal controls system, organizational safeguards against risks), containment and reduction of risk, regulatory capital (prohibition to distribute profits or other elements of capital, holding capital in excess of minimum requirements).

The general factors directing the selection of such measures are given by: the nature and severity of the deficiencies found; the evolution of scores over time (the persistence of negative evaluations or their tendency to deteriorate are particularly relevant); the timing and effectiveness of the initiatives possibly implemented by the intermediary; the degree of awareness, ability and reliability of management.

As mentioned in the case of an overall score equal to 4, corrective actions may concern – along with the situation of the intermediary – individual or cross-cutting risk areas, determining which components (quantitative and/or qualitative) of risk areas show the most serious problems in order to adjust measures accordingly.

Whenever the most appropriate corrective measures need a more or less extended time to deploy their effects (as is the case of measures aimed at strengthening the organization), analysts will consider the opportunity to combine them with more effective short-term measures.

The corrective actions are adopted following the procedure described in par. II.3.

Should the intermediary's situation be significantly deteriorated, or serious administrative irregularities or serious violations of laws, regulations or bylaws be found, the adoption of extraordinary measures should be considered [3].

I.2.2 Supervisory actions following inspections

Inspection findings encourage a thorough discussion on the adequacy (in terms of intensity and scope) of actions in progress, especially if weaknesses or specific problems have arisen, to determine whether to continue along that same path or change it in light of new evaluation elements.

In general, it is also necessary to adequately enhance the amount of information gathered through inspections, with particular regard to the qualitative aspects of management (governance and control systems, strategies, management issues, risk management, etc.), thus making them the pivot of supervisory action in the interaction with the intermediary.

[3] As described in Part 1, crisis procedures (special administration and compulsory administrative liquidation) are not covered by this Guide.

This implies the careful testing of the suitability of corrective initiatives concerning deficiencies uncovered by the Supervision, their follow-up – collecting detailed references on implementation – and the evaluation of their effects on the technical and operational situation.

In order to assess in detail the intermediary's answers to the observations contained in the inspection report, Supervision units responsible for off-site monitoring may resort to the contribution of the head of the inspection team.

Following the assessment of both the firm's comments on the inspection findings and any closer checks made, it might prove useful to prod and sensitize the corporate bodies by means of warnings, recommendations or advice in whatever way is deemed most effective.

Should inspection findings highlight the need for corrective measures, the criteria set out in Chapter II shall be followed.

I.3 Specific supervisory measures regarding groups

The SREP on banking groups and investment firms groups follows a consolidated approach; the supervisory action, inspired by a similar logic, shall be:

- adjusted according to the evaluations given to the group on a consolidated basis;
- addressed to the parent company, as it is the Bank of Italy's counterparty.

Fact-finding and intervention needs regarding single group entities should be included in the action to be carried out at the consolidated level.

In coherence with the guidelines provided in Part 1 of this Guide (Section I, par. II.7), fact-finding actions on group's components are intended to improve the understanding of:

- the exposure of the group as a whole to risks and the organizational solutions adopted to manage them. Closer analyses typically concern "significant entities";
- the reasons for particularly negative evaluations (scores 5 and 6) given to the group as a whole. In such case, those intermediaries mostly responsible for problems are subject to close analysis and monitoring.

Should the fact-finding activity trigger a meeting with the bank officers, in general the bodies of both the parent company and the subsidiary would participate (see par. I.6.4).

In general, corrective actions should be directed to the parent company, even when they concern single components, because the parent company – in exerting its direction and co-ordination powers – is required to issue

orders directed to subsidiaries for the proper implementation of the Supervision's instructions.

Whenever a subsidiary is the recipient of the corrective measures, the selection of the most appropriate ones should be aimed at creating a structure of incentives directed at spurring both the parent company and the subsidiary to fix the weaknesses. For example, in case of initiatives targeted at strengthening capital, the measure concerning the single component might be designed so as to also benefit the capital adequacy and the limitation and reduction of risk at a consolidated level [4].

When specific measures are adopted (see paragraph II.3), it will be necessary to contact the subsidiary concerned formally, also to comply with the requirements of Law 241/90 (as amended). Similarly, in the presence of deviations from prudential requirements applicable on the individual level, the action should also be directed to the entity and adjusted to its specific situation.

For asset management companies belonging to banking groups or investment firms groups, the actions to be taken shall be determined case-by-case, to identify the recipient in advance (parent company and/or management company). In general, it is appropriate that actions – when they influence strategies, governance, organization or products management – are addressed directly to the management company – given the operational independence that should characterize it – establishing how to inform the parent company, where necessary.

I.4 Specific supervisory measures regarding intermediaries with authorized internal systems

Supervisory actions on intermediaries allowed to use their internal risk measurement systems to calculate capital requirements for credit, market, counterparty and operational risks should be closely coordinated with the authorization process and use the content of the related measure as a reference point.

The fact-finding action and the intervention should therefore be mainly directed at verifying:

- the compliance over time with the regulatory requirements for the initial adoption of such systems for prudential purposes;
- the state of implementation of those interventions that may have been required of the intermediary in the authorization process;

[4] For example, instead of imposing an additional capital requirement to the subsidiary at the individual level, it might be preferable to apply – on a consolidated basis – higher risk weights to the subsidiary's exposures: the parent company would thus have stronger incentives to stimulate the subsidiary to take appropriate steps to remove the identified weaknesses.

- the compliance with the "roll-out" plan (gradual extension of the internal system) presented by the intermediary and the completion of any modification decided during the implementation;
- the compliance with the requirements for the permanent partial use of measurement methods other than those recognized (where this is allowed by the applicable regulation).

For all the operational details, please refer to Section III.

The general standards apply to fact-finding actions and interventions on profiles other than those covered by authorized systems.

I.5 The planning of supervisory actions

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I.6 The interaction with intermediaries: goals and instruments

I.6.1 Foreword

As mentioned in Part 1 of this Guide (see Section I, par. II.1.6), controls and analyses are carried out by enhancing the interaction with intermediaries, with the aim of exchanging information.

In relation to the objectives pursued, the dialogue – usually promoted by the Supervision – can be informational, provisional or “follow-up".

The dialogue tools are: a) requests for information; b) meetings with bank officers; c) inspections.

The way instruments are chosen, aimed at limiting costs for supervised entities, depends on the type of interaction (informational, provisional and “follow-up”) and its specific goals.

Guidelines on purpose and means of interaction are provided below. As to the latter, attention is focused on the first two tools, whereas inspections, also useful to meet needs of interaction with intermediaries, are dealt with in Part 3 of this Guide.

I.6.2 Informational, provisional and follow-up interactions: purposes

A. Informational interaction

With an intensity and frequency tailored on intermediaries (proportionality principle), the informational interaction aims to improve the analysis of risk exposures, cross-cutting aspects, the ICAAP. In this regard, it aims to:

- qualify the interpretation of data available off-site, obtaining information useful to complete these assessments, clarifying the reasons underlying the detected symptoms of deterioration;

- promote – in the relationship with the intermediary – a mutual understanding of the analyses carried out; from the intermediaries' point of view, interacting with the Supervision facilitates the identification of refinements to be made on methodologies and internal measurement systems and processes.

Objectives, timing and means of informational interaction [5] are normally set in the planning of the Evaluation Cycle.

The informational interaction may also be appropriate in the examination of administrative procedures [6], to check compliance with the regulatory requirements.

The interaction differs depending on the macro-categories of reference. In general, the interaction is triggered by the Supervision to satisfy information needs which increase in size and articulation along with the significance, complexity and level of customization of the intermediaries' risk management systems and capital adequacy self-assessment processes.

The dialogue between the Supervision and intermediaries is, therefore, more intense and continuous for the most significant intermediaries and/or for those opting for non-standard systems for the calculation of capital requirements and ICAAP methodologies (indicatively, intermediaries belonging to macro-categories 1, 2 and 3). Part 1 of this Guide contains indications on the frequency and main counterparties for this type of interaction, differentiated by macro-category.

B. Provisional interaction

It is aimed at presenting to the intermediary – whenever weaknesses or specific problems have arisen – the results of the Evaluation Cycle [7] and to stimulate a self-definition and implementation of remedies. Such interaction may also take place once the results of the Evaluation Cycle or inspection have been communicated, to closely look at the initiatives envisaged by the intermediary.

Such interaction:

- is more accurate for the intermediaries affected by serious problems;
- is normally attained through a meeting with the corporate officers; it may go along with the presentation of the Inspection Report. [8]

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5 Especially if the interaction is achieved through the calling of meetings with bank officers or inspections (see below).

6 These may concern both the initiatives directed at expanding the operational capacity (see Section II), as well as the authorization to use the internal risk measurement systems for prudential purposes (see Section III).

7 This, in turn, may follow occasions of informational interaction.

8 By the officers of the Bank of Italy's Department or Branch responsible for the intermediary.

The interaction with the intermediary aims, inter alia, to verify the degree of awareness of the management, the materiality of the commitments undertaken (including the estimated time necessary to achieve full stability) and the overall responsiveness to supervisory actions.

As a result of this interaction, the Supervision unit evaluates the need to formalize in a letter the assessment of the intermediary's situation and the suitability of the feedback provided.

Should the measures envisaged by the intermediary result inadequate (for example with regard to completeness, effectiveness, articulation, timing of initiatives), the use of more incisive interventions should be considered.

C. "Follow-up" interaction

"Follow-up" interaction verifies the state of implementation of the measures autonomously taken up by the intermediary or imposed by the Bank of Italy.

It may use the specific reporting (supplemented with the assessments made by the corporate bodies and the heads of the control functions) possibly required from the intermediary to periodically report to the Supervision the progress of corrective measures, the time planned for their completion, and the results obtained.

The outcome of the "follow-up" interaction may lead to adjust the severity of supervisory actions, to adapt them to any changes in the intermediary's situation (see also par. II.5).

I.6.3 The interaction tools: the request for information

In using this tool – designed to acquire documents, data or information in addition to ordinary prudential reporting – the following points are of particular significance:

1) the selection of information requirements.

In principle, information requirements are identified in the planning phase of the SREP, especially if the closer study involves the acquisition of data which is complex to prepare for the intermediary. In this regard, the effort required of the intermediary and the actual benefits for the Supervision have to be considered, ensuring that the requests do not determine an onus on the intermediary which is not counterbalanced by an added value for the analysis.

The information need may also arise in the control and analysis activity, in order to supplement the available information, seek clarifications, etc.; inter alia, reference is made to: a) risk assessments, whenever these find new weaknesses or problems, or the worsening of pre-existing vulnerabilities; b) corporate events or relevant external factors requiring a prompt response by the intermediary (for example, episodes of non-compliance, events that might tarnish the intermediary's reputation, particular market situations, etc.).

Under the provisional or ”follow-up” interactions, the request for information is, in principle, designed to obtain an update and clarifications on the state of initiatives or measures announced by the intermediary and the results obtained.

To satisfy the information needs, it is necessary to select:

- the most appropriate type of information (quantitative and/or qualitative), privileging usefulness, verifiability and completeness; in general, the acquisition of documents unsuitable for an effective off-site supervision should be avoided;
- the most efficient means of collection and submission, taking account of the type and amount of the data required and the techniques used for their processing, thus distinguishing between information that is occasional, systematic, or specific for one or more intermediaries [9];

(text omitted)

I.6.4 The interaction tools: meetings with corporate officers

This is a valid instrument to get to know the management and gather information on the intermediaries' strategies and activities, to complement and cross-check the data used in controls and analyses.

The style of the meetings shall avoid any interference with the intermediaries' business independence, as meetings are one of the main ways to put into practice the control activity carried out by the Supervision and the care it takes in dealing with the intermediaries.

Within the off-site interaction, convening the corporate officers is a crucial moment in the dialogue with the intermediary about the way it plans, conducts and monitors operations (from the definition of strategies, to the identification of the ensuing risks, to the choices in terms of capital and organization).

In the context of provisional or “follow-up” interactions, direct contacts are effective also to sensitize the corporate management to current issues.

It may be opportune to invite the corporate officers to structure the information given in the meeting – also in the light of the remarks made by the Supervision – in a note also intended to formally get their evaluation of the issues discussed and to guide the subsequent verification activities.

The convening of the meeting, also feasible by videoconference, may be general – i.e. intended to discuss the intermediary's overall situation and, in particular, the SREP outcome – or sectoral.

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[9] Depending on the situation, the intermediary's internal data may be acquired or more complex arrangements may be used (for example, a specific format or “record pattern” can be adopted for data to be processed electronically). Should the information satisfy the needs of several users, a proper coordination of the initiative is desirable (for example, on a Department or Area level).

A. The general convocation

It is a top-level occasion of interaction with supervised entities. Normally, participants are the heads of the supervisory and/or management and/or control bodies. Considering the level and role of counterparts, it is opportune for these meetings to be coordinated by the heads of the Bank of Italy's Departments or Branches.

The general convocation is normally centered on the intermediary's overall situation, its strategic and operational perspectives, governance issues and the business policies (also with reference to specific sectors), with particular regard to risk management, capital and organizational safeguards related to risks, and internal controls.

The findings of the assessments and evaluations carried out by the Supervision are illustrated and discussed with the corporate executives, to receive information and evaluations.

In the provisional or "follow-up" interaction, attention should be drawn on the major issues concerning the intermediary in order to assess its awareness, examine the current or planned initiatives, and ask for operational adjustments.

B. The sectoral convocation

Compared to general meetings, the sectoral ones have a more technical-operational slant, are mainly directed to middle management, [10] and are essentially targeted at acquiring an in-depth knowledge of specific areas, risk management methodologies, self-assessment of capital adequacy, and the control systems.

Convening sectoral meetings is useful to complement the information used in off-site analyses as well as to establish a dialogue with the middle management on the choices made.

Such meetings may focus for instance on the situation of business areas such as lending, finance, foreign network, holdings, intra-group relations, as well as organization, internal control functions and IT issues.

The benefit is usually proportional to the complexity and size of the intermediary. In particular, for intermediaries belonging to macro-categories 1, 2 and 3 this type of meetings helps to ensure the necessary continuity of interaction with corporate functions (in particular, internal auditing and risk management), which play an important role in controlling business risk.

In the dialogue with these functions, improvements to the systems of governance and control and to organizational safeguards for the various risk areas may be discussed. Although desirable from the point of view of the Supervision, such actions must always result from an independent

[10] It is desirable that, in case of intermediaries belonging to macro-categories 3, 4 and 5, invitations to the meetings are channelled through the intermediary's head office.

decision of the intermediary within the framework of a comprehensive assessment of its operational needs.

In these cases, consistently with the technical nature of the meeting and given the presence of middle managers, the opportunity to formally report to the corporate bodies the issues emerged from the discussion should be considered.

Similarly, should anomalies be unveiled during the meeting, it is appropriate to continue the discussion on the remedies with the corporate bodies.

C. The convocation of intermediaries belonging to groups

Given the consolidated perspective of the review and evaluation process, in the case of groups, general and sector convocation to meetings are directed at the officers (members of the top or middle management) of the parent company (and/or the centralized structures) and – where appropriate – the entity competent for the supervisory initiative being implemented.

The joint convocation of the parent company's and subsidiary's officers may be appropriate in provisional interactions (prior to the adoption of measures on the subsidiary) or when the interaction concerns issues involving both entities (for example, development projects of the subsidiary; issues involving the group internal control functions, etc.).

In some instances – e.g. situations characterized by high managerial autonomy of the subsidiary or conflict within the group, by close assessments of strategies, governance, organizational structure or management of asset management products – convening the subsidiary's officers only might be advisable while considering the possibility – if necessary – to continue the interaction at the parent company's level.

I.6.5 Preparation and reporting of the meeting

(text omitted)

CHAPTER II
Corrective measures

II.1 Introductory remarks

In general, the way actions are chosen and presented depends on the seriousness of deficiencies, timeliness requirements, the degree of awareness, capability and reliability of corporate bodies, and the availability within the intermediary of human, technical and capital resources.

The use of the intervention power by the Supervision shall be consistent with the goals set out by regulations: every corrective action shall be carefully weighed in terms of expected costs and benefits. Corrective measures must be proportionate to the severity of the problems and realizable by the intermediary within a reasonable timeframe.

Corrective actions consist of measures characterized by growing intensity in terms of contents and form, which may imply:

a) the accurate listing of goals to be achieved and the timeframe to fulfill them while entrusting the intermediary, on its own responsibility, with the task of identifying the most effective measures, without enforcing limits or rules other than the ordinary ones;

b) the adoption of specific measures, for prudential purposes, to enforce on the intermediary specific actions concerning the regulated matters (organization and internal controls, capital adequacy, permissible holdings, limitation of risk, disclosure) or operational limits or prohibitions;

c) the use of other legal powers of intervention intended to correct or resolve irregularities, inaction or specific negligence (see, inter alia, Article 19, paragraphs 5 and 7, Article 20, paragraph 2, Article 26, paragraphs 2 and 3, Articles 62, 63 and 109, paragraph 4, of the 1993 Banking Law; Article 7, paragraph 3, Article 8, paragraph 5-*bis*, Article 13, paragraph 3, Article 14, paragraphs 6 and 7, Article 16, paragraph 2, of the Consolidated Law on Finance);

d) the adoption, when the pertinent preconditions are fulfilled, of crisis procedures (see Title IV and Article 111 of the 1993 Banking Law, and Part II, Title IV of the Consolidated Law on Finance) [1].

[1] It should be kept in mind that in the case of banks some corrective measures (in particular, the prohibition from undertaking new transactions and the closure of branches) may be taken in case of violation of laws, regulations or bylaws or for management irregularities (Article 78 of the 1993 Banking Law). Similarly, for intermediaries active in investment services (investment firms, asset management companies, banks) the injunctive remedies of Article 51 of the Consolidated Law on Finance may be adopted (prohibition from undertaking new transactions and imposition of any other limitation with regard

The criteria and methods for implementing the measures falling under letters a) and b), more directly related to the SREP, are regulated in the following paragraphs.

The adoption of corrective measures can be decided according to:

- the outcome of the Evaluation Cycle, when the score is 4, 5 or 6. In such cases, the corrective action – which materializes after the interaction with the intermediary – assumes that the initiatives autonomously undertaken (or planned) have been evaluated as inadequate in terms of nature, scope and implementation timing;
- the outcome of inspections with a negative evaluation;
- the quick deterioration of the operational equilibrium and/or the emergence of irregularities or violations of regulations that require timely actions (for example, capital deficiencies vis-à-vis the prudential requirements; fraudulent behavior of officers/employees).

II.2 Regulatory sources

(text omitted)

II.3 The procedural aspects of measures

II.3.1 Formalization

Corrective actions should be formalized in a separate act, to ensure compliance with the principles governing the administrative procedures, not least the transparency of decision-making.

Depending on the type and purpose of actions, formalization may take place in two different ways:

- letters of intervention; this method can be used whenever the corrective action is undertaken in the context of the provisional interaction, or in all instances in which the Supervision deems it necessary to list in detail the goals to be achieved as well as the related timeframe (for example, the strengthening of governance and controls and of organizational safeguards for the various risks), and outline the steps to be taken, while leaving to the intermediary the duty to identify the most appropriate actions;
- specific measures; this method is used for corrective actions aimed at imposing obligations or limits other than general ones. These measures are taken within the context of procedures on the Supervisor's own

to each type of transaction involving single services or activities, at single branches or establishments of the intermediary) for violations which may affect general interests or for the urgent protection of investors' interests.

authority and are carried out in accordance with the principles and procedures provided for by the law [2] as well as the implementing regulations [3] which govern the administrative action (for further details see paragraph II.3.2). Also included in this case are: the measures to strengthen the organization, which consist in imposing specific organizational obligations, other than those provided in general under the regulations; restrictions on operations; prohibition from carrying out certain transactions; limitation of activities already carried out or of the network; and operations on capital.

The procedure for specific measures should include a preliminary examination stage.

II.3.2 Specific measures: procedural stages

(text omitted)

II.3.3 Motivation

The drafting of intervention letters and specific measures is crucial to confer effectiveness to interventions, also with regard to the legal obligation to motivate acts.

In the definition of contents, it is advisable to separate the description of anomalies found from the illustration of measures.

First of all, anomalies shall be highlighted [4] by presenting the reasoning of the analysis, the most significant data and its impact on the technical and organizational equilibrium. The identification of the basic causes is useful for defining more precisely the area of intervention falling within the sphere of responsibility of the corporate bodies.

The illustration of problems is the prerequisite of the "mandatory" part of the letter, containing the corrective actions and/or interventions necessary to remove the causes of anomalies and prevent further deteriorations or the emergence of new problems. From a prudential perspective and in accordance with the principle of gradualism of supervisory actions, the areas requiring action and the steps to be taken are identified, possibly

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2 "If compatible, the principles on the identification and functions of the person in charge of the procedure, the participation in the procedure and the access to administrative acts pursuant to Law n. 241 of 7 August 1990 as amended, apply to the Bank of Italy's procedures […] directed at the issuing of individual acts. Authorities' acts […] must be motivated. Such motivation shall state the legal grounds and the facts determining the decision, in relation to the findings of the examination." (See Article 24 of Law n. 262 of 2005)

3 See Regulation of 25 June 2008, which identifies the deadlines and organizational units in charge of administrative procedures the Bank of Italy is competent for, concerning the exercise of banking and financial supervisory functions, pursuant to the Articles 2 and 4 of Law n. 241 of 7 August 1990 as amended.

4 For example: processes for the selection and management of lending, assets rigidity, poor risk-return correlation, size of operating costs, poor productivity, organizational weaknesses, scarcity of capital.

entailing the preparation of a reorganization plan and compliance with a set timeframe.

To make interventions more effective, they should be directed at the top management; moreover, it is usually advisable to order the discussion of their content in a meeting of the governing bodies (possibly, a joint meeting), whose convocation is required and agenda is set pursuant to Article 53, paragraph 3, letter b) of the 1993 Banking Law and Article 7, paragraph 1, letter b) of the Consolidated Law on Finance [5].

The letter may be preceded by a convocation of corporate officers by the competent supervisory unit.[6]

II.3.4 Post-inspection actions

Such actions are connected to inspections ending with a negative evaluation which trigger corrective measures or step up measures previously started.

The action takes place, normally, through a post-inspection letter, whenever the inspective assessment corresponds to an overall score equal to 4.[7] The letter is written following the analysis of the reply to the findings, in order to ascertain the intermediary's level of awareness with regard to those problems that have been found and check its ability to organize effective countermeasures.

Consistently with the principles outlined in Part 1, Section I, paragraph II.8.2 of the Guide, the letter is based on the information contained in the inspection report; integrations can be drawn, if useful, from the most recent information obtained through off-site supervision.

While avoiding rigid reference patterns, it is desirable that the post-inspection letter is sent to the top management to:

- retrace both the previous supervisory action (if relevant) and the specific problems detected during the inspection, while referring to the findings and observations reported to the intermediary for further details and clearly emphasizing their determinants and effects, both current and prospective, on the technical aspects and the organizational structure;
- summarize the main elements of the intermediary's reply and the evaluations made by the Supervision about the adequacy of past and

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5 It should be kept in mind that the Bank of Italy is legally empowered to proceed directly to the convocation of governing bodies whenever the competent bodies have not done so.

6 If the meeting is held at the Bank of Italy's headquarters, it must be considered whether the presence of other units dealing with cross-cutting issues is necessary having regard to the topic to be discussed (for example, macro-prudential analysis, validation for prudential purposes of internal risk measurement systems, analysis of risks).

7 The supervisory unit may decide to convoke the corporate officers, as an alternative to sending a post-inspection letter.

current initiatives as well as that of resources, tools, methods and timeframe. Gaps and shortcomings in the reply should be explicitly illustrated in the body of the letter requesting appropriate integrations, if necessary;

- indicate the management aspects in need of actions by the intermediary to fix problems as well as any corrective measures imposed by the Supervision;
- define, where necessary, contents, methods and timeframes for reports on the status of implementation of initiatives as well as results achievements.

If the inspection findings highlight problems (overall scores 5 or 6), unless the pre-conditions for the starting of crisis procedures apply, the top management is normally informed by means of a letter handed out with the findings and observations files (thus known as "contextual post-inspection letter"), in accordance with the deliberations collegially taken at the intra-functional meeting (the procedure is described in par. II.6).

This responds to the need to undertake urgent measures to prevent any further deterioration and to spur the management to take appropriate reorganization measures adequate to the severity of the situation; normally, these should be structured in a plan to be submitted to the Bank of Italy.

For timeliness reasons, any specific measures are adopted within the context of the post-inspection letter through an urgency procedure; this will be mentioned in the measure itself.

The outcome of administrative procedures still in progress – whose elapsing has been suspended to start the assessments necessary to further analyses – is also determined at this stage (see Section II, Chapter I).

II.3.5 Relations with CONSOB

(text omitted)

II.4 The contents of the measures

II.4.1 Identification criteria

The following general criteria apply:

- the weaknesses and problems that may determine the adoption of corrective measures are described in Part 1, Section III of the Guide;
- the content of the intervention must be closely linked to the objectives of supervisory action, as set in the planning stage (also in light of the “follow-up” outcomes), and must be modular, since it may consist of one or more different measures;

- the choice will vary depending on the degree of awareness, ability and reliability of corporate officers, the intermediary's availability of adequate human, technical and capital resources and the results of previous supervisory actions;
- although it would be appropriate to carry out the action gradually, the moment of its inception is very relevant: in general, the most "coercive" measures may be taken immediately in situations of serious or persistent problems (whose negative effects are likely to deteriorate, for example as a result of operational expansion or of an inappropriate policy of profit distribution). In this context, the application of additional capital requirements is usually necessary in the presence of widespread organizational shortcomings, whenever the implementation of other measures cannot produce effects in an acceptable timeframe (see par. II.4.6);
- the effectiveness of interventions (and the extent to which they are shared by the entity's management) depends on many factors: the clear statement of goals pursued; the timely identification of areas of weakness and their causes; the consistency of the required measures with the type and severity of problems found.

II.4.2 The strengthening of systems, procedures and processes

Unless the intermediary has already acted independently, the emergence of organizational shortcomings, especially if these may impact technical aspects, may trigger the request for interventions to reinforce the organization to be stated by paying attention to: the actual actions to be demanded; the corporate bodies to be involved; the time set for implementation.

A. Strengthening Measures

These may concern: corporate governance, business organization, the system of internal controls, risk management.

The most appropriate corrective actions will vary depending on the size and intensity of problems, as they may refer to one or more organizational aspects and concern one or more types of risk, according to the intermediary's level of exposure.

(text omitted)

II.4.3 Limitation of risk, also by prohibition of certain types of transactions

Risk limitation measures aim to limit the intermediary's future operations, thus preventing its exposure from further increasing through ordinary activities.

Their adoption requires the presence of high levels of risk and the absence of adequate organizational safeguards.

In general, before starting any corrective action it is necessary to make sure that the intermediary is actually unable to govern, manage and monitor the risks undertaken.

This assessment shall be carried out, in particular, for those intermediaries specialized in finance, where an unfavorable evaluation of the quantitative component of "financial risks" may not mark an anomaly but rather be the result of a search for higher levels of risk/return.

In these cases, before undertaking such actions, it is necessary to accurately assess the qualitative component of the profile, in order to verify the adequacy of the organizational safeguards; it would also be appropriate to take a closer look at other aspects, such as profitability and capital adequacy.

(text omitted)

This kind of interventions centers on the intermediary's obligation to refrain from starting new operations in the most risky areas. The identification of these areas should begin with the assessment of the risk profile(s) that mostly contribute(s) to cause a largely negative overall score.

For example intermediaries may be forbidden to operate in the field of credit and/or financial derivatives, to provide a specific investment service, to take on additional duties as a depository bank, and to finance customers from a specific geographical area or economic sector.

Prohibitions for asset management companies may include the establishment of new funds or the expansion into new product categories, even in the absence of a specific administrative procedure in progress (see Section II, Chapter X).

II.4.4 Risk reduction also through operational or network limitations

Measures to limit risk pertain particularly problematic situations ***(text omitted)*** that make immediate action necessary in order to prevent an irreversible deterioration.

Such measures concern current operations and may consist in the limitation of:

- the activities that caused the high riskiness, through the obligation to quickly close all or part of the existing transactions falling within the scope of forbidden activities as well as the prohibition to start new ones;
- the network, by imposing the closure of one or more branches.

As explained in the previous paragraph, the identification of these areas should begin with the assessment of the risk profile(s) that mostly contribute(s) to cause a largely negative overall score.

It has to be noted that these interventions may entail costs for the intermediary (for example, penalties for the termination of existing contracts

or for staff relocation) or losses (arising, for example, from the closing-out of financial derivative contracts should the intermediary be inhibited from carrying out such activities).

Their adoption should therefore be carefully weighed and limited to really serious cases, impossible to solve through other corrective actions.

If the limitation implies the prohibition of an authorized activity (for example, trading on own account of financial instruments), the intermediary shall initiate a new authorization process to be able to carry out the activity again.

II.4.5 Limitations on the distribution of profits or other elements of capital

Measures prohibiting the distribution of profits and/or other elements of capital shall be pondered with extreme care, because they may have repercussions on intermediaries – especially on those listed on a stock exchange – by limiting their ability to collect equity and/or debt capital on markets or by increasing the related cost.

Thus, these measures shall be taken in the most serious cases, when the compliance with minimum capital requirements and the management of the current and/or expected risk level are difficult, or when these obligations are not met ***(text omitted)***.

Should the immediate or quick termination of transactions and/or closure of branches result in sizeable losses for the intermediary, with negative repercussions on its situation, this kind of interventions may be adopted jointly with risk-reduction measures. In this case, the action can be justified by the longer time granted to the intermediary to close down the operations or branches.

II.4.6 Measures directed at capital: general aspects

In general, this kind of measures consists in requiring to:

a) hold an amount of supervisory capital higher than the overall capital requirement; in turn, these measures may consist in:

   - the imposition of additional capital requirements, also known as "specific requirements";
   - the application of target ratios;

b) for intermediaries subject to Pillar Two rules, strengthen the total capital calculated through the ICAAP [8].

[8] It should be kept in mind that the "total capital" constitutes the financial resources that the intermediary intends to hold to cover the total internal capital quantified through the ICAAP (see Part 1, Section III, Chapter X, Annex 4). “Total capital” includes both supervisory capital items as well as other resources that the intermediary deems adequate to cover total internal capital.

Such actions – one alternative to the other – are characterized by a decreasing level of severity and cost for the intermediary.

Additional capital requirements ("specific requirements") bind the intermediary to continually hold an amount of supervisory capital of no less than the total capital requirement plus the specific requirement. Any failures to comply are infringements punishable under the 1993 Banking Law and the Consolidated Law on Finance.

Depending on the severity of the intermediary's problems and the intervention goals, the specific requirement can be:

- related to a specific type of risk;
- commensurate with the total amount of risk-weighted assets;
- determined by applying a specific treatment to elements concurring to the calculation of capital requirements.

As a result of the application of target ratios, the intermediary is required to hold supervisory capital consistent with pre-set levels of the "Tier 1 ratio" and the "total risk ratio" [9]. Without prejudice to the compliance with the total capital requirement, any misalignment with the targets does not constitute in itself a breach of regulations; rather, it leads the Supervision to consider whether the corrective measure already undertaken should be strengthened or adjusted.

One of the objectives pursued through target ratios is to smooth pro-cyclicality, especially in relation to the use of internal risk measurement systems for credit risk. A worsening economic situation, resulting in increasing credit losses, may make the loan loss provisions inadequate. If at the beginning of the economic downturn intermediaries have supervisory capital close to the required minimum, the difficulty of raising capital leaves no alternatives – in order to preserve compliance with capital requirements – to a contraction of assets, which may make the recession worse: the temporary absorption of capital buffers above the total capital requirement may allow to manage pro-cyclicality problems more flexibly.

Thus, misalignments with target ratios may typically occur in adverse situations of the cycle or as a result of extraordinary corporate events [10].

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[9] The "total risk ratio" is the ratio between supervisory capital (including third-level capital instruments that can be used to cover market risks) and the total risk-weighted assets, the "Tier 1 ratio" is given by the ratio between Tier 1 capital and the total risk-weighted assets. In some cases it may be useful to refer to the "core Tier 1 ratio", the ratio between Tier 1 capital, excluding innovative and non-innovative capital instruments, and the total risk-weighted assets. The risk-weighted assets are obtained by multiplying by 12.5 the total capital requirement.

[10] In order to strengthen the capital position, lower levels may be set by the Supervision ("trigger ratios") – falling between the minimum requirement and the "target ratio" – above which the intermediary commits to limit the temporary absorption of the capital buffers.

The target value can be set on the basis of an intermediary's specific situation or be adjusted by category of intermediaries sharing common characteristics (intermediaries belonging to the first two macro-categories).

The strengthening of total capital is a commitment that the intermediary enters into – following spurring by the Supervision, within the sphere of the ICAAP interaction – to increase the amount and/or improve the quality of financial resources held to cover the total internal capital.

This could lead to an increase in supervisory capital if the initiatives undertaken by the intermediary concern resources that are or might be included in it. If the intermediary fails to comply with this commitment, a re-assessment should be made – also in light of the evolution of the situation – on whether to change the type of action.

The circumstances in which the aforementioned actions may be taken and how they should be determined will be discussed in the following paragraphs.

II.4.7 Measures directed at capital: specific requirements

A. Weaknesses of the organization, internal controls and risk management systems (credit, counterparty, market and operational risks)

A specific requirement is applied if significant deficiencies are discovered in governance and monitoring systems and in the systems to manage the risks subject to minimum capital requirements. The weaknesses should also be assessed in light of the level of exposure to the risk.

The methodological framework for the assessment of deficiencies is set in the analysis schemes of governance and monitoring systems as well as individual risk profiles, with specific regard to the component of organizational safeguards (see Part 1, Section III).

(text omitted)

B. Aspects of internal risk measurement systems used for prudential purposes not fully consistent with the intermediary's operational complexity and risk profile

The application of specific requirements as a result of the checks made before authorizing the use for prudential purposes of internal systems for calculating credit, counterparty, market and operational risks is based on the overall evaluation of those systems, according to the criteria set out in Section III, which should be consulted for full details.

Specific requirements are applicable both at the time of the initial authorization and as a consequence of subsequent monitoring activities.

(text omitted)

C. Specific requirements: the capital adequacy profile

Measures directed at capital may be necessary when the capital profile shows strong evidence of weakness related to the adequacy of supervisory capital, total capital or both.

The first benchmark to guide the choice of the most appropriate measure is the amount of excess capital (the difference between supervisory capital and total capital requirement). The corrective action takes different connotations in the two situations described below.

1) If the supervisory capital insufficiently covers the total capital requirement (capital misalignment), an incisive and timely corrective action – directed at urging a quick restoration of compliance with prudential rules – will have to be undertaken.

Once the intermediary's capability for autonomous recovery is verified, the intermediary is asked to develop a plan to raise capital (possibly articulated into intermediate targets), to rapidly drive the supervisory capital above the requirements. The concrete initiatives (capital increases, issuance of subordinates, disposal of deductible holdings, etc.) must be identified by the company management and promptly formalized.

The request for a recapitalization plan may go along, where necessary, with the prohibition to distribute profit (see par. II.4.5) and the imposition of a specific capital requirement. The latter aims to ensure a capital surplus enabling compliance with prudential requirements even for future needs.

2) If excess capital is positive but small for the overall risk profile and the intermediary thus shows weaknesses in the adequacy of supervisory capital, the action to be taken shall be decided in light of the evaluation given to the ICAAP.

The application of a specific requirement can be considered for the cases characterized by serious problems where the limited excess capital does not provide an adequate buffer to cope, at least in part, with the capital needs arisen from the ICAAP (Pillar Two risks, stress scenarios, expansion strategies).

The possibility to apply an additional requirement should be considered when assessing the simultaneous presence of the following situations: a) modest surplus of capital – to be assessed with regard to both total and Tier 1 capital – above the total capital requirement; b) inadequacy of total capital for the needs of risk coverage and business development.

(text omitted)

II.4.8 Measures directed at capital: target ratios [11]

The application of target ratios can be considered whenever excess capital is limited, total internal capital is close to supervisory capital and the estimate of the requirements for risk coverage and business development appears reasonable.

The application of a target ratio is even more appropriate when surplus capital is limited.

(text omitted)

Given the nature of this measure, in these cases the supervisory action should hinge first on the primary component of supervisory capital by identifying a "target Tier 1 ratio" above the regulatory minimum, which should go along with "total target ratio".

Since target ratios are not sanctions (unlike specific requirements), the intensity of supervisory actions may be adjusted to the specific situation; intermediaries are however required to ensure that, in the medium term, capital levels are not lower than the set targets.

In this sense, target ratios can also be evaluated as an alternative to the immediate adoption of specific requirements, given their great flexibility and adaptability and their full adherence to a vision of agreement between intermediaries and the Supervision about the capital levels to be attained and maintained over time, which permeates the regulation of the Pillar Two.

II.4.9 Measures directed at capital: the strengthening of total capital [12]

In all cases other than those mentioned above, and in particular when the intermediary has an adequate capital surplus, the focus shifts on the qualitative and quantitative adequacy of total capital.

In particular, should the total capital be found inadequate to cover risk and support the development of business, the intermediary should be asked to strengthen it whenever size and/or composition are not fully suitable to cover the total internal capital.

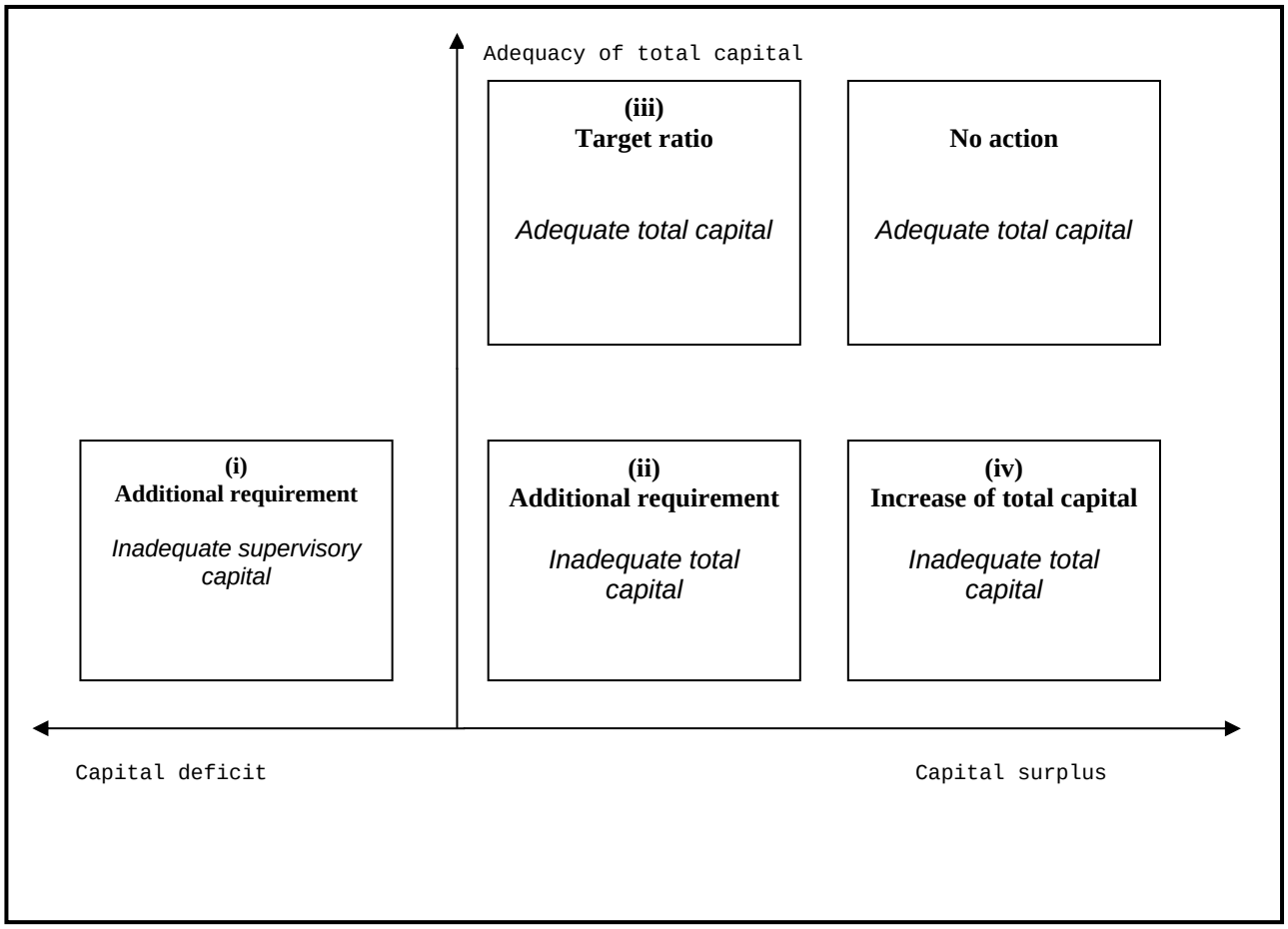
(text omitted)

The above remarks are shown in Table 5, which summarizes the possible situations.

[11] The application of this type of corrective action does not constitute a specific measure under par. II.3.2.

[12] The application of this type of corrective action does not constitute a specific measure under par. II.3.2.

Table 5



II.5 Activities following the actions ("follow-up")

Once the corrective actions have been formalized, including the deadline for implementation and the reporting to the Supervision, the analysts monitor the intermediaries' activities.

The "follow-up" stage is essential to:

- check if the intermediaries implement the actions required and whether these are consistent with what indicated by the Supervision; this activity takes particular importance especially in long-term actions (e.g. requests to strengthen the organization);
- assess, if appropriate, the possible termination of corrective actions once the resolution of problems is checked (for example, whenever the intermediary proves to be able to manage its risks adequately and it is no longer necessary to prohibit certain categories of transactions). These findings should normally be based on inspections.

It is useful to establish internal periodic deadlines (to be also considered when planning activities) to evaluate any deviation of the intermediary's initiatives from expectations. If necessary, actions can be adjusted to such deadlines in light of the evolution of the situation, also taking account of additional information offered periodically by the intermediary.

Based on all checks performed, a choice may arise between:

- concluding the corrective action, possibly ahead of schedule, if the intermediary has promptly implemented all the initiatives required;
- prolonging the corrective action or strengthening it through additional requests and/or initiatives whenever the intermediary's response diverges more or less significantly from the demands of the Supervision.

II.6 Emergency procedure for the examination of corporate situations

(text omitted)

SECTION II

ADMINISTRATIVE PROCEDURES AND ORGANIZATIONAL ASPECTS OF DECENTRALIZED ACTIVITIES

CONTENTS

CHAPTER I
General instructions

I.1 Foreword

The regulation on administrative procedures consists of Law 241/90 (and subsequent amendments) and the Regulation of the Bank of Italy of 25 June 2008, which lays down the deadlines and the organizational units in charge of the administrative procedures for carrying out banking and financial supervision, under Articles 2 and 4 of Law 241/90 (and subsequent amendments), hereinafter "Regulation pursuant to Law 241/90" [1].

The scrupulous compliance with regulation, with particular regard to procedures and deadlines, is necessary, considering the liabilities for the Bank of Italy in case of non-compliance.

This also derives from the provisions of Law 241/90, according to which in *ex parte* procedures the petition is normally granted if the Authority does not issue a specific decision before the deadline expires ("silence-means-assent principle").

The required tasks need to be carried out with the necessary accuracy and the applications have to undergo the hierarchical approval process in due time before the set deadlines.

The Guide provides the criteria for the examination of the most common petitions; a profound knowledge of the reference regulation is always necessary.

(text omitted)

[1] This Guide deals with the administrative procedures different from those regarding the intermediaries' initial authorisation and crisis procedures.

SECTION III

THE PRELIMINARY ACTIVITY OF INTERNAL RISK MEASUREMENT SYSTEMS' AUTHORIZATION FOR PRUDENTIAL PURPOSES AND THE MONITORING STAGE

CONTENTS

CHAPTER I
Procedure for the recognition of internal systems: aspects common to different risks

I.1 Foreword

Prudential supervision rules provide that intermediaries may use their own internal measurement systems to determine credit, market, counterparty and operational risk capital requirements as an alternative to simplified methodologies and following authorization by the Bank of Italy.
The authorization ("recognition") by the Supervision to use an internal risk measurement system ("internal system") for prudential purposes is subject to the verification of compliance with a set of organizational, quantitative and information system requirements. Therefore, such verification is purely prudential and its object and purposes do not constitute a general evaluation of the intermediary's business decisions, which remain in the responsibility of the corporate bodies.
The authorization may be accompanied by specific requirements – also with regard to the level of capital – whenever certain aspects of the system are not fully consistent with the intermediaries' operational complexity and risk profile, provided that the system's overall validity and reliability are not jeopardized.

I.2 The recognition process

Given the high complexity and significant organizational impact of internal systems, before formally applying for authorization intermediaries may submit projects and supporting documentation to the Bank of Italy (the "preliminary contacts" stage). The submission of projects at this stage does not lead to the initiation of administrative procedures.

The second stage is activated by the formal application: in this stage the intermediary's ability to meet the requirements set by prudential regulation is evaluated in full.

I.2.1 Preliminary contacts

The objective of this stage is to assess the intermediary's preparedness with regard to the requirements set for the chosen approach: normally, the examination of the technical documentation submitted by the

intermediary, the convening of the involved executives [1] and inspections are envisaged.

The decision to apply for the recognition of an internal system must result from a clear act of will by the corporate bodies. Before this stage, the Supervision therefore needs to ask for an appropriate resolution by the intermediary's supervisory body, which should state: the full support for the project, the degree of involvement of different bodies and structures, the implementation planning and the necessary investments.

At this stage, also in terms of efficient use of corporate and Supervision resources, the results of self-evaluations carried out by the intermediary, the information on progress made, the actions planned (and their timing) to ensure that the system is in line with requirements are particularly important.

(text omitted)

I.2.3 Submission of the application and verification of the documentation completeness

The submission of the application triggers the formal stage of the recognition process, in which the internal system's compliance with the prudential requirements ("regulatory requirements") is evaluated.

To process the application, detailed information on the internal system is needed: in particular, information on databases and systems supporting them, on the logics followed to build and calibrate the models for the estimation of risk parameters, on the methods used to integrate the system into the corporate processes as well as on the control mechanisms of (and on) the internal system.

To this end, the intermediaries intending to use an internal system must produce the mandatory minimum documentation required by the prudential standards [2].

Such support documentation will enable the Supervision to have the information necessary for an assessment of the internal system updated until the time the application is submitted, and to develop a comprehensive plan for the subsequent audits. Naturally, the Supervision may request more detailed information to attain a thorough assessment of the application.

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1 Consistently with Part 1 of this Guide, meetings with corporate officers take place at the Bank of Italy's premises. If meetings are held at the intermediary's offices, they are conceived as "debates": as these are not inspections, they do not entail verification liability and are not intended to check or formalize findings to the intermediary.

2 The documentation should be forwarded not just in paper but also electronically; it should be user-friendly in accordance with guidelines agreed with the Group responsible for the recognition and contain a list of all provided documents, each accompanied by a brief description.

The Analysis Division in charge of the intermediary, supported by the Group responsible for the recognition, verifies the documentation completeness and consequently notifies the intermediary.

With regard to those tasks linked to the initiation of the procedure, please refer to par. I.2 of Section II.

I.2.4 Verification of compliance with the requirements: off- and on-site assessments

In carrying out verifications on compliance with regulatory requirements, the Group responsible for the recognition uses specific "check lists" prepared for each type of risk (for these lists, please refer to the specific Chapters of this Part of the Guide).

The off-site analysis allows the Group responsible for the recognition to gather information on the degree of implementation of the internal system, on the steps taken to work out previously detected anomalies or to carry out in-depth studies on specific issues (often concerning planning or quantitative matters).

In addition to the analysis of the documents supplied by the intermediary (among these, in particular, those related to self-diagnosis processes), a significant step can be to convene the management of the organizational units actually involved in the development, implementation and maintenance of the internal system (for example: risk management, internal audit, organization, accounting, planning, control, IT, etc.).

Moreover, the analysis of risk factors and control safeguards of each business process connected to the internal system implies the availability of a broad and comprehensive background, mainly based on qualitative information collected by means of inspections.

The emphasis on on-site verification of the business processes comes mainly from the need to: a) verify the quality and reliability of the internal system data flows; b) investigate practical aspects; c) evaluate whether the system might be actually used for risk management purposes (so-called "use test").

In addition, inspections allow to determine the senior management's level of awareness of and involvement in the project as well as the degree of control exercised by the independent risk control unit on the different stages of risk monitoring and management (in particular: processing of quantitative information; preparation of procedures for the verification of data quality; production of reports for the senior management) and the functionality and independence of the function responsible for the recognition process.

Inspections are performed by a specific group formed by the Head of the Supervision Inspectorate, which also includes members of the Group responsible for the recognition.

The investigations may be subdivided into different stages according to a modular approach, lasting from a few days to several weeks, depending on the type of risk, the complexity of the activities and the presence of multiple risk-taking sites (in Italy and/or abroad).

The main goal of on-site inspections carried out during the preliminary contacts is to identify level of development and degree of compliance of those aspects of the internal system whose off-site verifiability is limited. The outcome of inspections is reported in a document signed by the Head of the Inspection Team and undergoes a simplified review process by the Supervisory Inspectorate on the basis of the criteria set out in Part 3 of this Guide.

Normally, at the end of the inspection the findings are illustrated in a letter and formally submitted to the intermediary. The letter is prepared by the competent Analysis Division in cooperation with the Group responsible for the recognition.

The on-site verification following the formal application consists in the assessment of the progress of initiatives and actions required to fix the deficiencies identified in the preliminary stage. In order to avoid – to the greatest possible extent – duplication of activities both for the Supervision and the intermediaries, the attention is directed to those parts of the internal system for which, during the preliminary contact stage, the intermediary had not yet identified solutions for removing the problems detected or, where solutions had been identified, their practical implementation still has to be verified.

As for inspections, carried out both during the preliminary contacts stage and during the phase following the presentation of the formal application, Inspection Teams will adhere to the analysis process as defined in the "check list" that the Group responsible for the recognition uses to accurately verify compliance with regulatory requirements.

I.2.5 Completing the examination and drawing the final proposal to the competent operational unit

At the conclusion of the activities, the Group responsible for the recognition prepares a final report where: a) it summarizes the results of the tests carried out; b) it issues its opinion on the internal system’s adequacy in relation to regulatory requirements; c) it gives its final opinion on the application.

The report, to be completed on the basis of the form set out in Annex I/1, should be delivered together with the "check list" and the evaluations' final table, defined for each type of risk, through which the Group responsible for the recognition gives a detailed breakdown of the analyses performed and states the internal system's degree of adequacy in relation to regulatory requirements.

These requirements are divided into three areas of examination: organizational requirements, quantitative requirements, and information systems. Each area is, in turn, articulated into assessment profiles for each type of risk.

A rating articulated in four scores has to be given for each evaluation profile and each of the examination areas based on the results of the tests carried out (from "1", equivalent to full compliance, to "4", which indicates non-compliance). Likewise, a final rating is given by the Head of the Group responsible for the recognition, on the grounds of the relevance of the remarks made for each examination area.

In awarding such ratings, automatisms or highly detailed guidelines are not set, given the difficulty in standardizing an assessment that should take into account the internal systems' peculiarities, the IT-organizational choices, the interconnections between the degree of compliance with the various requirements: thus, the ratings are given by the Head of the Group responsible for the recognition on an essentially "experience" basis, taking into account all the elements that have arisen in the course of the activities carried out.

The scale of the assessments is the following:

Rating 1

corresponds to full compliance with regulatory requirements. It normally does not call for any organizational action.

Rating 2

indicates situations of non-significant deviations: a) which are deemed likely to be solved in a reasonable timeframe without requiring drastic actions or significant changes in the working plan; b) whose extent the intermediary shows to have grasped and with regard to which the various functions involved clearly demonstrate to be aware of the actions needed to address them.

Rating 3

indicates situations of non-compliance which (i) while not serious, nevertheless require significant actions or (ii) are joined to a limited awareness of deficiencies.

Rating 4

corresponds to partial or full non-compliance with regulatory requirements, serious enough not to allow the recognition of the internal system, even if just a single area of examination is concerned. In such a case, the intermediary should face and solve the specific problems that hinder recognition before a new application is submitted.

I.2.6 Definition of specific capital and/or organizational measures

As said, the regulations provide that the authorization may be accompanied by specific requirements, also with respect to the level of capital requirements, in relation to certain aspects of the internal system which are not fully consistent with the operational complexity and the intermediary's risk profile, assuming that the overall validity and reliability of the internal system are not affected.

Thus, the rules allow to impose special measures, in the form of specific capital requirements (see Section I, par. II.4.7, point B), or to call for organizational interventions, until the shortcomings have been eliminated, making intermediaries aware of the necessity to improve the internal system [3].

Moreover, given the strong connection existing between the quality of capital estimates and the organizational, quantitative and information systems requirements necessary to achieve it, the capital measures arising from the internal system's recognition should always be accompanied by requests for appropriate interventions on the organization.

The possible application of a specific capital requirement is related to the presence of aspects of incomplete compliance with the regulatory requirements. This measure may be structured as: a) a "floor" with respect to a reference base, b) an "add-on" to the measure deriving, directly or indirectly, from the internal system.

The capital requirement under a) above is normally applied, in particular during the initial stage of internal systems' adoption, in the presence of widespread problems affecting multiple risk profiles which, however, do not compromise the systems' overall reliability. The basis of reference is determined in accordance with the rules provided by the Circular 263 (Title II, Chapter 6, Section II, par. 6); starting in 2010, the capital requirement calculated according to the standardized approach for credit risk and the basic approach for operational risk will be used as the reference basis.

Unlike the "floor", the "add-on" is set separately and differently for each type of risk (credit, operational, market, counterparty), as it depends on the ratings given to the three areas of examination; it is set in terms of percentage increase of the requirement for credit and operational risks and rise of the multiplier of the requirement for market and counterparty risks. Therefore, the "add-on" lends itself to urge the removal of deficiencies relating to specific risk profiles or the estimate of underlying parameters.

[3] These are not specific measures under Section I, par. II.3.

In the identification of the “floor" or “add-on” measure, the need to preserve the incentive to adopt internal systems for prudential purposes should be taken into account. Therefore, the capital increase should normally be quantified in such a way as to allow a capital benefit in comparison to the standardized methods of requirements calculation.

General indicative criteria are as follows:

- no increase in the requirement in the presence of an overall rating equal to 1;

- in case of ratings 2 or 3, increases should be applied. These should be correlated to the value given by the sum of the scores of individual areas of examination (growing values correspond to growing "floor"/"add-on" measures) [4].

I.2.7 Reaching and communicating the final decision

According to the report drafted by the Group responsible for the recognition, the competent Analysis Division, also taking into account other available information, will prepare – with the help of the Group itself – the report to the Governing Board – Directorate and the act accepting or rejecting the application.

I.3 The recognition procedure for “intermediaries with relevant international presence” [5]

The instrument to be used for carrying out the recognition activity – within the broader supervisory controls on these intermediaries – is the “college of supervisors” (see Part I, Section I, Chapter IV of this Guide).

As from initial contacts, coordination with the authorities (‘host Authorities’) in charge of supervision over foreign entities (‘subsidiaries’) is necessary. The exchange of information with these authorities begins once the parent undertaking submits to the Bank of Italy the implementation plan for the adoption of the internal system, before the formal request for recognition is presented. Such a plan constitutes the base for planning and distribution of tasks among the various supervisory authorities involved in the recognition activities.

[4] With a maximum equal, usually, to 50% of the capital requirement, in the case of a "2" rating, and 100% for a "3" rating (see Section I, par. II.4.7, B).

[5] Reference is made to the intermediaries falling within the first SREP macro-category (see Part I, Section I, Chapter I of this Guide).

Such a structured exchange of information allows to avoid duplication of activities and to reduce costs for intermediaries [6]. Therein, the updating of information regarding the organization as well as the technical and operational characteristics of the banking group is an essential step for the development of a shared plan of action for the recognition of the internal system.

The first pieces of information to be exchanged mainly regard the following issues:

- geographical location and legal status of the main subsidiaries of the banking group;
- importance of such entities as to the overall activities of the banking group and the financial system of the host country;
- typology of the activities carried out by such subsidiaries;
- intensity of integration of the risk management functions of the subsidiaries with those of the parent undertaking;
- kind of system(s) that the intermediary intends to use to calculate the capital requirements and its (their) mode of use (exclusive or shared) by the subsidiaries;
- deadlines concerning the internal system adoption, broken down by activity segments (business units/portfolios/products);
- internal rules aimed at developing, managing and maintaining such systems.

On the basis of the information collected, the methods of allocation of responsibilities and tasks among the different supervisory authorities are determined, generally reflecting the organizational structure (centralized or decentralized) of the risk management function: the delegation to the host authorities of activities related to the recognition is all the more extensive the more the tasks of development, internal validation and maintenance of the internal systems are assigned to the subsidiaries.

In the specific instance of the internal system for calculating the capital requirements for credit risk, the decentralization of the credit risk management functions allows the banking group to exploit the subsidiaries' knowledge of the local market, to adjust the system to its specificities. In those cases the host authorities are in a position to better assess the internal systems' adequacy. The main limit of such approach lies in the possibilities of regulatory arbitrage offered by the existence of several different systems applied to the same market segment.

[6] In order to encourage the exchange of information within the college of supervisors, it is advisable to implement a website, provided with suitable security characteristics and managed by the Group responsible for the recognition, where to upload the entire documentation to be shared with the host authorities. Such a website may as well be used for the activities following the recognition of the internal system.

In the distribution of tasks and responsibilities among the supervisory Authorities, two aspects of the recognition activity must be discerned:

a) risk measurement methods;

b) the use of such methods in the corporate operational processes.

With reference to the aspect under a), the Bank of Italy as a lead supervisor is in charge of the assessment of the centrally-developed systems concerning the whole group, while the assessment activities regarding the compliance with the regulatory requirements of the systems developed by the subsidiaries and pertaining to their sectors of operations are generally delegated to the host authorities [7].

As regards point b), the Bank of Italy delegates the host authorities competent for the subsidiaries making use of such systems to carry out the following verifications: (i) use of systems for operational, managerial and control purposes ('use test'); (ii) adequacy of the technological infrastructure; (iii) quality of data and information used; (iv) reliability and effectiveness of the internal control systems; (v) possible adaptations of centrally developed systems to local market conditions. Anyhow, in such cases it is necessary to check the overall consistency of the selected systems and the comparability of the resulting risk measures [8].

Should the group structures be particularly complex, specific coordination tasks of the activities carried out by some host Authorities may be delegated to other host Authorities [9].

As far as the procedural aspects are concerned, please refer to the prudential regulation in force (Circular 263, Title I, Chapter 1, Part 5, paragraph 2.5).

I.4 Intermediaries controlled by an EU parent undertaking

Reference is made to the prudential regulation in force (Circular 263, Title I, Chapter 1, Part 5, paragraph 3), making it clear that the use of

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7 A particular case is that of systems developed by a subsidiary to support activities which are highly advanced locally and subsequently extended to other segments of the group; in this case the difficulty of identifying pre-determined solutions to assign roles in the recognition process suggests determining the respective tasks on a case-by-case basis, so as to maximize the efficiency and the effectiveness of the supervisory activity.

8 In the case of an internal system for the calculation of operational risk capital requirements (should the system be single and centralized), the quantitative elements on which the dialogue with the host authorities should be developed mainly concern the mechanisms for the allocation of the consolidated requirement to the pertinent local entities.

9 It is the case, for instance, of a host authority competent on a subsidiary acting as a sub-holding servicing other subsidiaries of the banking group.

instruments and resources to offer cooperation to the foreign authorities playing the role of lead supervisors is inspired by the principle of proportionality. In particular, for small Italian subsidiaries cooperation may simply consist of off-site assessments.

I.5 Periodical monitoring and changes to the internal system after the recognition (general aspects)

After the recognition, the competent Analysis Division typically carries out the monitoring activity by using the resources of the specialized Division of the competent Department (Specialized Risks Support Div. or Risk and Financial Innovation Analysis Div.). Under particular circumstances the head of the Analysis Division can suggest to the head of the competent Department to leave the Group responsible for the recognition in activity until the plan for the progressive extension of the internal system is completed.

Monitoring consists in analysis activities whose frequency is diversified according to type of risk, and in a yearly report to the head of the competent Department.

Its purpose is to verify the constant compliance with regulatory requirements of the internal system's elements having already obtained the recognition. The object of the verifications is separately detailed for each type of risk.

A peculiar case relates to the use of the standardized approach (TSA) to determine the capital requirements for operational risk.

No authorization is envisaged in this instance and no administrative procedure is therefore started [10].

Nonetheless, an inspection based on the criteria set forth in Part Three, Chapter I, paragraph III.V.1 can be initiated should the need to carefully assess the quality of the intermediary's positioning vis-à-vis the regulatory requirements arise once the TSA approach is in use [11].

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[10] Pursuant to Circular 263 and the related application rules, once the requirements for the adoption of the TSA method are regarded as having been met, the intermediary informs the Bank of Italy (at least 60 days before the reference date of the first prudential return) of the intention to use such a method and submits the required documentation. The intermediary can start using the TSA to calculate the regulatory requirement from the date of reference.

[11] The verifications to be carried out ordinarily pursuant to Part 1, Section 3, paragraph VIII.4.2 B of this Guide are actually based on the self-evaluation process carried out by the intermediary and on the assessments supplied by the internal audit function. If deemed appropriate, in off-site supervision the analyst can refer to the methodologies set forth by Chapter 5 of this Section regarding the organizational requirements and the IT systems needed to use the AMA internal systems, allowing for the significant differences between the two approaches (TSA and AMA, respectively).

I.6 Structure of chapters pertaining to specific risks

Each chapter pertaining to the different risks (credit, market, counterparty, operational) provides, for the various suitability requirements, the indication and description of regulatory references, expected practices, verifications and information sources to be used.

Regulatory references concerning banks can all be found in Circular 263. For intermediaries other than banks (investment firms and Intermediaries 107), reference shall be made to the Regulation of 24 October 2007 (investment firms) and to the Circular 216 (Intermediaries 107) notwithstanding rules have the same content.

The expected practices identify behaviors – based on evidence and on experience developed internationally – which, if found, indicate compliance with the regulatory requirements. However, by their nature such practices do not limit the solutions available to satisfy the regulatory requirements on organization and quantitative methodologies; the Group responsible for the recognition may possibly identify other solutions on the basis of the analysis carried out.

Verifications are based on several steps aimed at accurately detecting every significant facet for the analysis' purposes, even in the most complex situations. In this respect, in many cases a partial application of the checks envisaged may be adequate for achieving the final objective, i.e. assessing the intermediary's compliance with the relevant regulatory requirements.

Annex I/1: Layout of the final report by the Group responsible for the recognition

A. Introduction

In this paragraph the object of the assessment must be illustrated:

- group entities for whom the authorization to use the internal system is requested;
- for credit risk:
  a) percentage, for each portfolio (or sub-portfolio), of exposures covered by ratings at the beginning and the end of the extension period;
  b) timeline and procedures of the extension plan designed to cover the initially uncovered portfolio (or sub-portfolios) for which the permanent combined use is not envisaged;
- for operational risk:
  a) percentage of the relevant indicator covered by the model at the beginning and the end of the extension period;

b) timeline and procedures of the development plan designed to cover the initially uncovered segments for which the permanent combined use is not envisaged;

- for market risks:

  a) general risk categories for which recognition is required and, within these, risk categories covered by the model at the beginning and the end of the extension period;

  b) timeline and procedures of the extension plan designed by the intermediary to cover the initially uncovered risk categories;

- for counterparty risks:

  a) exposure classes for which model recognition is required and, within these, percentage covered by the model at the beginning and the end of the extension period;

  b) timeline and procedures of the development plan designed to cover the initially uncovered exposures and for which the permanent exclusion is not envisaged.

Should the authorization process involve other supervisory authorities, the distribution of tasks in the various stages of the procedure shall be indicated; in particular, the distribution of roles and responsibilities has to be illustrated.

B. Summary of the analyses carried out

This paragraph briefly summarizes all the activities performed by the Group responsible for the recognition during both off-site assessments and on-site examinations. For further details reference can be made to the inspection reports produced at the end of on-site inspections.

C. General assessment

In this paragraph the Group responsible for the recognition:

a) states its overall assessment on the adequacy of the internal system for calculating capital requirements;

b) gives its opinion regarding the application for authorization.

The overall assessment usually results from the scores given to the three areas under examination [12] (resulting in turn from the ratings given to the single profiles). To this end, reference has to be made to ad-hoc

[12] These areas involve: 1. organizational requirements; 2. quantitative requirements; 3. IT systems.

"checklists" to assess the intermediary's compliance with regulatory requirements.

D. Description of the internal system and amount of the requirement

The main features of the internal system are shortly described in this paragraph and, where necessary, detailed in a technical annex.

The amount of the capital requirement calculated by the internal system and that obtained by applying the standardized approach to the same portfolio should be shown.

E. Critical aspects

All the intermediary's shortcomings found in the different areas under examination, which form the basis for the assessment by the Group responsible for the recognition, are summarized in this section.

F. Further research

The Group responsible for the recognition outlines in this section further issues possibly emerged during the assessments which, even if not directly related to the profiles under evaluation, could be usefully disclosed to the competent Analysis Division.

G. Annexes

A "checklist" duly compiled and a summary table of assessments have to be enclosed.

CHAPTER II
Credit risk

II.1 Organizational requirements

II.1.1 The role played by the supervisory, management and control bodies

(text omitted)

II.1.1.2 Expected firm practices

The supervisory body is expected to set the level of risk-aversion or risk-appetite of the intermediary in terms of consistent operational limits and responsibilities; adequate reporting levels to monitor the compliance with those standards shall also be designed.

The management body is expected to implement what the supervisory body has decided. This may consist, for example, in the detailed establishment of limits and delegations, or the operational guidelines to start dealing in new products and markets, or the updating of procedures.

Internal regulations should include indications on negotiated instruments and parameters to be used for risk assessment, structures of operational limits and responsibilities and criteria for their derogation along with procedures and reviews deadlines.

Consequently, the supervisory and management boards need to receive extensive reporting on the current risk level so that they can constantly monitor the performance of the internal system in terms of functionality and compliance with regulatory requirements.

The structure and frequency of information flows should be in line with the level of operations and the exposure to credit risk. Moreover, contents and frequency of reporting should depend on the hierarchical position of the person receiving the information, with more details being provided to the staff directly involved in operational decisions.

With respect to the control body, an effective integration and an acceptable interconnection between its activities and internal controls (internal validation, internal audit and compliance) are expected.

For intermediaries structured in groups, policy decisions at group level concerning credit risk management should be attributed to the parent undertaking, so that it can implement a consistent and integrated risk management. As for the internal system, the parent undertaking is responsible for its adoption and for defining its main features along with the implementation of the project, the supervision of the smooth functioning of

the system itself and its continuous improvement from a methodological, organizational and procedural standpoint.

(text omitted)

II.1.2 Portfolios segmentation

(text omitted)

II.1.2.2 Expected firm practices

In principle, the internal segmentation of portfolios for corporate purposes is based on policies different from those underlying the regulatory segmentation; therefore, consistency should not be strictly enforced and a limited misalignment between the regulatory and corporate definition of each portfolio is tolerated.

In particular, considering the conventional attribution of firms to the “corporate” or “retail” portfolios, it is acceptable that a certain number of firms included by the intermediary – for management purposes – among the "retail" exposures could fall within the “corporate” segment for regulatory purposes, or vice-versa.

Obviously, these cases should represent exceptions, not the rule, and should be constantly monitored by the intermediaries.

With particular reference to the "corporate" class of exposures, its categorization as "retail" is possible if, for management purposes, the intermediary treats such exposures according to the same standards applied to "retail" ones. Notwithstanding this, "retail" exposures could also be managed individually in certain stages of the credit risk management process [1].

(text omitted)

II.1.3 Structure of line controls

(text omitted)

II.1.3.2 Expected firm practices

Line controls should aim to monitor the smooth functioning of both preliminary activities and those following the rating assignment.

With reference to the preliminary activities, for example, the choice of the IRB system best suited to evaluate the customer or the transaction is particularly relevant, along with the study of the economic or legal

[1] The fact that an exposure has a specific rating does not rule out the possibility of treating it as a retail exposure.

connections among customers, the correct information gathering for the assignment and update of ratings (data entry controls, monitoring of the updating of financial statements, etc.).

With respect to the subsequent activities, the checks on the individual final ratings issued by the internal system are essential. For IRB systems centered on an automatic component, such controls should also involve the methods of handling qualitative information converted into quantitative data (for example, through questionnaires providing standardization of qualitative inputs).

(text omitted)

II.1.4 Validation of the internal system: general aspects

(text omitted)

II.1.4.2 Expected firm practices

The standards adopted for performing the validation should be clear and documented with reference to the purposes, deadlines and staff in charge.

From an organizational standpoint, the solutions adopted depend on the structure and characteristics of the intermediary, its activities and available human resources.

To this end, indicators of adequate independence are the following: a) formal hierarchical independence of the manager in charge for validation from those involved in lending and ratings assignment; b) the fact that the validation activities are carried out by people having no responsibility on the processes under examination and not remunerated according to the performance of those processes.

When the function in charge of the validation is also involved in the development of the IRB system, the intermediary is expected to set up separate units responsible for development and validation, respectively; in such instances, more accurate controls by the internal audit are necessary.

As for the contents of the activities to be performed, the scope of the validation should include:

- all components of the IRB system (main features and structure, risk parameters, controls, data processing facilities), to be assessed also in terms of overall consistency;
- all the phases connected to setting up and using such system: development, parameter calibration analysis, system performance, benchmarking and stress tests, “use tests”.

In groups where the various units in charge of the validation are located in different entities, the parent undertaking should play a key role in assigning and coordinating duties and activities to be carried out.

(text omitted)

II.1.5 Internal auditing

(text omitted)

II.1.5.2 Expected firm practices

The internal audit function should monitor, at least annually, the adequacy level of the internal system vis-à-vis the requirements set for its validation.

Within the general annual examinations or through targeted assessments, the internal auditing is expected to focus controls on the most critical aspects arising from the validation process, the reports by the unit developing the IRB system or other indicators designed for that purpose.

It is also convenient for the audit function to follow a formal schedule of the activities to be performed, so as to ensure a “control coverage” on the overall internal system and at least on the main risk-taking units.

The results of the auditing process are expected to be clearly and promptly reported to the top management and the units in charge of the development of the IRB system. Furthermore, the internal audit should oversee the actual elimination of malfunctions or weaknesses, thus ensuring the effectiveness of audit operations.

As to quantitative issues, the internal auditing should also use examination methodologies of quantitative nature, by applying procedures and measures based on parameters determination techniques different from those used by the development function. As a matter of fact, it is advisable for the internal audit function to produce – through samples or on particularly complex areas – independent assessments that, cross-checked with the "control" examinations, highlight anomalies or inconsistencies in risk measurement.

(text omitted)

II.1.6 Documentation on the internal system

(text omitted)

II.1.6.2 Expected firm practices

The full formalization envisaged by regulations should be regarded by intermediaries as a mean i) to give the highest objectivity and transparency

to the development process of the IRB system and ratings assignment and ii) to accordingly encourage a commonality of practices by the various structures and people using the internal system. These needs are all the more relevant for intermediaries characterized by high complexity, articulation and dispersion of the credit risk-taking units.

The documentation should also allow more effective controls by both the competent intermediary's structures and external parties.

(text omitted)

II.1.7 Completeness of information

(text omitted)

II.1.7.2 Expected firm practices

IRB systems differ according to the relevance attributed, respectively, to automatic ratings and to those assigned by credit experts. As a general rule, one should distinguish:

- systems based on automatic processes (possibly including qualitative elements converted into quantitative data), where discretionary and motivated adjustments by analysts ("overrides") are structurally excluded;
- systems in which assessments can be adjusted – through overrides – with new information not easy to standardize or, in general, not taken into account;
- systems basically centered on subjective/discretionary assessments by sector experts.

Intermediaries choose the most suitable system, taking into account their main operational, dimensional and organizational features as well as the exposure classes such systems will apply to.

Whatever the choice, ratings must be based on "complete", "significant" and "pertinent" information to correctly quantify, through the rating, the risk of the counterparty or transaction.

For example, in case of corporate lending, information can be regarded as :

- "complete", if it includes a large set of profiles, covering the main business segments and/or the counterparty's situation;
- "significant", when the profiles considered can explain most of the counterparty's risk characteristics;
- "pertinent", if the aspects examined are tailored to the counterparty under assessment or, when market sectors are involved, the observed trends are those impacting on the counterparty's risk profile.

Obviously, if the information underlying the rating process ("process input") shows deficiencies in terms of completeness, significance or pertinence, the rating reliability ("process output") would in turn be reduced, with negative repercussions also on the calculation of capital requirements.

With respect to the completeness of data, for customers performing complex operations (such as corporate customers), considering that the automatic component of rating may not be sufficient to summarize the client creditworthiness, it is advisable to implement a rating system supplementing the automatic algorithms with a discretional qualitative judgment ("override").

In any case, the regulation emphasizes that the "override" has to be carried out on the basis of pertinent and significant information for an accurate assessment of the counterparty's creditworthiness.

(text omitted)

II.1.8 Rating reproducibility

(text omitted)

II.1.8.2 Expected firm practices

The IRB system should be objective; therefore, pursuant to regulation, it should be possible to recalculate every rating at any time.

To this end, there should be a possibility to trace all activities that led to the rating attribution. The intermediary should therefore keep the quantitative and qualitative information concerning each phase of the rating attribution process. In particular, all decisions taken throughout the process – including provisional ratings – should be recorded (even digitally), including the reasons behind any "override".

(text omitted)

II.1.9 Integrity of the rating attribution process

(text omitted)

II.1.9.2 Expected firm practices

According to regulation, conflicts of interest may arise whenever the staff responsible for the final attribution of rating: a) perform an activity evaluated on targets based on volumes or earnings on lending, or b) have decision powers on credit granting.

Moreover, in practice it is often found that intermediaries assign the task to perform discretional assessments on ratings to staff in contact with

customers, assuming that they possess competences or information particularly useful to assess the clients' creditworthiness (commercial executives or people working in the lending units).

Such a choice increases a conflict-of-interest situation for these staff members: executives who are encouraged to increase volumes or earnings on lending or are given credit-granting decision powers may base their rating assessments on incorrect criteria to have the credit granted.

Consequently, the intermediary is required to ensure that those responsible for credit granting – or having interests in the incentive mechanisms related to volumes of earnings generated by the lending business – are not also responsible for the attribution of the final rating. Obviously, these members of staff may well have a role in the rating attribution process [2].

As for other members of staff somehow included in a structure which benefits of such incentives or who are empowered to grant credit, the intermediary is required by regulation to implement adequate systems to mitigate conflict-of-interest situations.

An appropriate "ex ante" measure could be to award these members of staff incentives based on the correctness and accuracy of the ratings assigned (to be assessed, for example, through back-testing results); an "ex post" precaution might be to introduce specific controls on the way such members of staff have used discretionary powers (for instance, if the person assigning the rating made almost exclusively upward "overrides", the reasons for such behavior should be studied to check whether there is a systematic distortion of assessments).

If the organizational model envisages the concentration of responsibility for the final rating attribution on a dedicated unit (which, in practice, is usually denominated "internal rating agency" or "rating desk"), the intermediary is expected to comply with the following criteria:

- appropriate organizational positioning of the structure and protection of its independence from the functions responsible for promotion and lending;
- high hierarchical ranking of its manager;
- appropriate quali/quantitative composition of its resources and existence of incentives able to prevent imprudent behaviors;
- clear discipline of "override" powers;

[2] Salesmen may well have the responsibility of filling in the questionnaire for the qualitative segment, if the internal system has it. They may also propose the "override", provided that it is approved (or confirmed) by a different executive or unit not susceptible to conflicts of interest, such as an internal "credit rating agency" or even a person working in the credit area if the delegation system does not assign him/her decision powers on the granting of credit; it could therefore be the case of an executive of the credit area higher in ranking than the person responsible for the decision on lending, or a person working in credit within the same geographical area as the branch in which the executive responsible for the decision on lending works.

- accurate identification of the portfolio characteristics, in terms of number and relevance of the positions to be evaluated by the unit.

With respect to the class of retail exposures, which usually are of small size, the typically high standardization of the processing of information – including qualitative information – and the small margins of discretion in the evaluation permit to assume that the integrity of the rating attribution process is safeguarded.

However, if a counterparty approach is also adopted for this class, the implementation of organizational and procedural safeguards consistent with those envisaged for the "corporate" segment is expected, so as to protect the integrity of the rating attribution process.

(text omitted)

II.1.10 Homogeneity of ratings

(text omitted)

II.1.10.2 Expected firm practices

Intermediaries should consider homogeneity in the evaluations as an important objective: first of all, for a correct quantification of the level of risk taken by the various lending units; secondly, for an equal treatment of all customers.

Greater precautions should be taken in case of "judgmental" models, or of those incorporating an element of human discretion ("override"), because the risk of an insufficient uniformity in the rating attribution process is significant. Impacts on homogeneity may also materialize in the automatic models, during the data entry phase.

(text omitted)

II.1.11 Uniqueness of ratings

(text omitted)

II.1.11.2 Expected firm practices

The risk of non-uniqueness of ratings increases as the intermediary's size and articulation grow. These are obviously much more relevant in groups (IRB systems designed and implemented in a "stand-alone" perspective; lack of a single information and accounting system within many groups).

At least for the largest exposures, intermediaries are expected to assign to a single structure the responsibility for awarding the final rating or for attributing exposures to pools. The assigned rating should be used by all

operational units of the intermediary or group for regulatory (capital requirements) and management purposes.

Appropriate organizational and procedural arrangements prove particularly necessary in cases where, despite the presence at the various units of the same IRB system and similar processes for assigning ratings, differences exist in terms of: data used about position development, qualitative questionnaires (filled in by different operators); overrides (made by different people/units); time of rating assignment, with ensuing change in the client's situation.

(text omitted)

II.1.12 Ratings' update

(text omitted)

II.1.12.2 Expected firm practices

In relation to the purposes of regulation – making sure that the process of rating update is characterized by responsiveness – the intermediary is expected to set a deadline for the update and to: i) develop operational guidelines for regulating the actions to be undertaken in the presence of a deterioration in the relationship signaled by exposures' monitoring procedures and systems; ii) identify the indicators of anomalies symptomatic of a deterioration in the counterparty's creditworthiness.

In case of deterioration of credit risk indicators above specific thresholds, the intermediary may envisage the immediate start of the process leading to rating revision. If the deterioration does not exceed those thresholds, the intermediary may instead decrease the standard rating review time by a certain number of months.

It is desirable that the need for an immediate review of ratings or a rescheduling of the rating revision is promptly reported to the management, at a hierarchical level coherent with the amount of the exposures involved.

(text omitted)

II.1.13 Using the internal system in business management: the "Experience Requirement"

(text omitted)

II.1.13.2 Expected firm practices

The actual integration of the internal system in the overall credit granting and renewal process is facilitated by the definition of management policies calibrated on rating classes or groups of rating classes.

Such integration is facilitated if it goes along with making the intermediary's staff aware of the IRB system's strength factors. This should consist in appropriate training programs for the staff involved in the processes in which ratings are used, as well as in changes to the procedures aimed at establishing guidelines on the content of the various risk classes and mandatory comments on the rating given to grant a credit line (for example, by providing for a special box in the form).

In any case, the attribution or update of ratings should be a prerequisite for the assessments underlying the granting and the reviewing of credit lines.

The importance of ratings should gradually increase in the delegation of powers concerning credit granting, without however neglecting traditional parameters, such as nominal value and type of transaction.

The credit risk control unit usually performs descriptive analyses on portfolio riskiness (distribution of exposures among rating classes; average probability of default; expected losses): these tests should be progressively refined to include the analytical insights derived from the information on ratings [3].

Reporting to senior management should allow, through a concise but complete overview of the relevant variables, to follow the evolution of credit risk. Those in charge of the monitoring process for individual positions should be promptly provided with adequate information on the evolution of counterparties' credit risk as expressed by ratings, so as to be easily integrated into the methodologies of control of position development for individual exposures.

(text omitted)

II.1.14 Using the internal system in business management: the "Use Test"

(text omitted)

II.1.14.2 Expected firm practices

Additional sectors for which the internal system must play an actual role in management – in addition to those already dealt with for the "experience requirement" – are the governance functions and the capital allocation.

As to the former, information arising from internal systems should be used by the supervisory, management and control bodies and senior

[3] For example: highlighting, in aggregate terms, the volume of credits whose rating has worsened by more than one class ("double downgrade"); rating stability; speed and frequency of rating modifications; incidence of defaults; relationship between "upgrade" and "downgrade" at the portfolio level in a given period of time; changes in rating by line of business, market segment, type of credit line.

management for the definition of strategic and management choices, as well as in the oversight action.

With regard to the latter, it is important to define a logical process that, beginning with the correct measuring of credit risk, can determine a coherent allocation of capital among the different business units with the aim of creating value.

The use, for management purposes, of risk parameter estimates different from those used for the calculation of capital requirements should be limited to very special cases in which the use of certain risk parameter estimates for management purposes is objectively unfit (typical is the case of LGD "downturn", required for regulatory purposes, hardly suitable for management use).

(text omitted)

II.2 Quantitative requirements

II.2.1 Definition of default

(text omitted)

II.2.1.2 Expected firm practices

In the rating models' evaluation stage or in the PD quantification (calibration), intermediaries could use default definitions not fully compliant with regulation, mainly due to the lack of deep and reliable time series or to the need to exclude events not always indicative of a real pathology.

Using a definition of default narrower than the regulatory one (for example, situations of bankruptcy or receivership) partly facilitates estimates as the distinction between the two corporate groups (sound or bankrupt firms) in terms of potentially explanatory factors for default tends to be better clear-cut; at the same time, however, this choice makes the internal system less practical for credit assessments because it prevents the detection of the earliest signs of a firm's crisis.

In this case (definition of default narrower than the regulatory one), the intermediary is expected to prove that it has integrated data to achieve full correspondence to the results that would be obtained by using the correct definition. This means that, on the one hand, the consistency of (recalibrated) estimates with the portfolio's default rate (re-calculated on the basis of the regulatory definition) has to be evaluated and, on the other, the implementation by the intermediary of the steps necessary to achieve the full adoption of the regulatory definition has to be checked.

(text omitted)

II.2.2 Internal systems' structure: exposures to central governments and central banks, supervised institutions and corporates

(text omitted)

II.2.2.2 Expected firm practices

Regardless of the characteristics of the adopted IRB system [4], the evaluation of the counterparty's creditworthiness is conveyed through rating classes, i.e. homogeneous categories of obligors in terms of creditworthiness, by setting rules aimed at clearly identifying a counterparty as belonging to a particular class. The latter is a synthetic assessment of the counterparty's capacity to honor contractual obligations within a specific time frame. The articulation of a rating scale into risk classes should provide an ordinal scale of the level of risk associated to the intermediary's reference portfolio.

The intermediary is required to identify an appropriate number of classes and qualify their contents in a way that would make the risk for debtors in a specific class substantially homogeneous, at the same time preserving an adequate heterogeneity between different classes. The internal system should therefore be capable of producing an aggregation of "similar" counterparties in terms of credit standing and, at the same time, a meaningful differentiation of risk levels.

In the case of IRB systems based on quantitative methods, in order to group obligors into homogeneous classes, intermediaries set out a rating scale through an appropriate sequence of contiguous ranges of individual probabilities of default (PD) or scores designed to capture the heterogeneity of the counterparties' risk profile [5].

The inclusion of any obligor into a rating class should be done by comparing the estimated individual PD and the PD categories that define the intervals of the rating scale.

A single PD, representative of the default probability of all counterparties falling into the same rating class, has to be associated to each class. Therefore, the PD class should increase whilst moving from less risky rating classes to more risky ones.

Differently from retail exposures, the rating attribution process for counterparties falling into the "central governments and central banks", "supervised institutions" and "corporate" portfolios is expected to only reflect the risk of debtor insolvency.

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4 The characteristics of IRB systems are described in Annex II/1.

5 To simplify, from now on reference will be made to rating scales set up on the basis of the PD distributions. Therefore, considerations stated further on in this Guide will also apply to the rating scales set up on the basis of score distribution.

(text omitted)

II.2.3 Internal systems' structure: retail exposures

(text omitted)

II.2.3.2 Expected firm practices

Please refer to par. II.2.2.2 with the appropriate adjustments consisting in i) the possible presence of rating pools rather than rating classes, and ii) the need to take into account further aspects in addition to the borrower's risk characteristics in assigning exposures to rating classes or rating pools.

(text omitted)

II.2.4 Risk parameters' quantification: common requirements for PD, LGD and CCF

(text omitted)

II.2.4.2 Expected firm practices

(text omitted)

Where internal data is used, the definition of estimate samples should take into account the exposures in the portfolio, their distribution by size, economic sector and geographical area, as well as other relevant characteristics.

Where external data is used, the definitions of default and loss adopted by the intermediaries for the dataset construction should be consistent with the regulatory ones and data should be representative of the intermediary's portfolio and be used uniformly over time [6].

(text omitted)

II.2.5 Risk parameters' quantification: PD

(text omitted)

[6] In case of data shared with other entities (for example, within the same banking group), it is also necessary that: a) the definition of default used for each segment of the data set be homogeneous for the various intermediaries contributing to shared data; b) the significance of data in relation to the proprietary portfolio be proved according to set criteria, which include the comparability of the various categories of exposures for the most relevant segments of the shared data set and the use of appropriate statistical methods.

II.2.5.2 Expected firm practices

The PD quantification process begins with an assessment of the creditworthiness of individual counterparties, continues with a splitting up of the portfolio into homogeneous groups (rating classes) and ends with assigning a PD [7] to each rating class.

The three phases are closely interrelated, and the adoption of a certain methodology affects the ensuing choices: for example, the calculation of a PD class as the average of individual PDs is only possible if the model leads to the estimate of a truly individual PD.

The approach based on historical experience ("historical method") leads to an estimate based on the frequency distribution of the PD class: it results from the average (or other statistical indicator) annual default rates recorded by the intermediary.

Usually, the estimation is done by considering non-overlapping time intervals; in some cases, moving averages are used with the dual purpose of basing the calculation on a larger number of observations and achieve less volatile time series.

The historical method may determine PD curves that violate monotonicity (i.e. increasing PDs as the rating worsens). To correct this anomaly, PD interpolation methods, based on monotone functions (for example exponential) or non-parametric techniques ("kernel" estimates) may be used.

In any case, intermediaries are expected to prove that estimates take into account any differences between the IRB system that produced the data and the current one.

If the information set available to the intermediary is not considered appropriate to obtain a reliable and robust estimate of PDs, or the aim is to increase the expressive power of the rating scale, the intermediary may use a mapping with external data ("mapping method"). Such methodology consists in linking the intermediary's internal scale with that of a recognized rating agency (ECAI) and using the probability of default from the latter. This connection is made through the comparison of the criteria for awarding credit ratings internally and externally and of internal and external ratings for any obligor in common. A comparison of PD ranges or average levels of PDs between internal and external classes should also take place

[7] The articulation of the PD quantification process outlined here is purely illustrative, as such procedure may at the same time be split up into different phases or considered as a single process, and intended to highlight the heterogeneity of approaches that may be found in practice.

through the adoption of appropriate measures apt to neutralize or at least mitigate, the effects of differences in the underlying definitions of default [8].

Finally, in the case of models ("statistical method") whose output approximates a probability or is easily transformed into probabilities, class PDs may be calculated from individual PDs using an appropriate summary statistic (simple average, weighted average, percentile) [9].

Examples of statistical models whose output represents a probability are those based on logistic ("logit" model) and normal ("probit" model) distributions; on the other hand, an example of a model whose output can be easily transformed into a PD is represented by the linear discriminant analysis [10] (LDA).

In all three cases, the time frame used for the evaluation should be sufficiently long to make such evaluation less dependent on a particular economic situation. This goal can also be pursued through methodological adaptations designed to take into account particularly negative phases of the cycle. These choices should be adequately motivated.

The addition of an appropriate factor of caution in the intermediaries' estimates should occur, in particular, if the model presents a significant subjective component, or if the portfolio includes a small number of exposures in default.

Especially with regard to retail credit, seasonality (that is, the tendency of certain risk patterns to recur cyclically, at a given frequency, typically one year) may result in predictable default peaks in specific periods of time. Similarly, credit age may show, in the presence of statistical regularities, the tendency of a particular type of product (mortgage loans, for instance) to reach a maximum of defaults after a certain number of months or years. When these regularities are found, the joint effect of age and amount of granted loans should be carefully assessed.

(text omitted)

II.2.6 Risk parameters quantification: LGD

(text omitted)

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8 It should also be verified that risk quantification by the external entity be oriented to the debtor's creditworthiness rather than the transaction's characteristics.

9 If the model is evaluated on a sample presenting a default rate different from the portfolio, the intermediary should adopt calibration techniques, varying according to the type of model used.

10 The LDA score – discriminating score – may be transformed into a PD through the application of the Bayes theorem.

II.2.6.2 Expected firm practices

The accuracy of the LGD estimate is particularly important, since capital requirements calculated on the basis of the advanced IRB systems have a linear relationship with such parameter; thus, any underestimation of the LGD has direct consequences on the level of capital requirements.

Methods for measuring LGD are still at a preliminary stage. Empirical analyses carried out are neither numerous nor fully reliable, especially due to the difficulties in collecting data that would allow significant estimates [11].

In any case, the correct identification of all the components affecting the recovery rate is crucial for the design and implementation of the database architecture that the intermediary must use to collect the time series needed to estimate LGD.

In this regard, it should be noted that the regulation does not identify a "hierarchy" of the data sources available for the estimation of the LGD; however, in view of the greater adherence of internal data to the specific situation of the intermediary, regulation *de facto* considers this data as the basis for feeding models, especially if the intermediary does not sell exposures in default on the market and manages internally the recovery process of such exposures. In the presence of other ways of managing the recovery (sale to third parties) and in the absence of acceptable internal data, external data may be used.

As to the methodological aspects, the intermediaries' choices should identify the technical solutions best suited for their own characteristics and those of their assets portfolios.

Given the limitations imposed by regulations, intermediaries should limit their use of subjective and discretionary evaluations. However, subjective approaches could be used to determine the LGD of portfolios characterized by an inadequate number of defaults. In such cases, measures should be taken such as comparing the LGD estimates obtained through subjective approaches and those produced by more objective methods (for example, by inserting in the portfolio under examination counterparties in default taken from adjacent portfolios; for large industrial conglomerates, insolvent clients belonging to the large corporate segment may be added).

The methodologies based on market data are expected to be adopted for exposures related to portfolios such as the "large corporate", supervised intermediaries and sovereign issuers, whose liabilities have a good degree of liquidity.

It should be kept in mind that the observation of market prices ensures an accurate measurement of losses for those investors who sell their assets

[11] For a description of the main methodologies in use and some important aspects concerning the criteria of estimation of LGD, see Annex II/2.

immediately after the default, but this does not necessarily represent a proper quantification of the loss if the intermediary does not sell the asset on the market and manages the recovery process internally. In addition, market data is related to assets (bonds and syndicated loans) different from those typically found in intermediaries' portfolios.

The use of such methodologies makes it necessary for the intermediary to take special care in reviewing the definition of default (admission of the issuer to bankruptcy procedures or failure to make interest or principal payments) which may be different from the one set in the regulation. Even the definition of loss might be incomplete, since specific costs are not included in such a definition (for example, losses from interests accrued before the default or administrative costs different from those related to the bankruptcy procedure).

For "corporate" and "retail" portfolios, intermediaries generally use the "workout LGD" approach. In such a case, particular attention needs to be paid to the process of selection of the variables to be included in the model.

Intermediaries using the "look-up tables" approach should carry out an accurate analysis of the distribution in clusters of LGD rates and assess their stability and homogeneity: the aim should be the identification of LGD classes that share similar characteristics and show limited variance. The average LGD of each "cluster" is used as an estimate of the loss rate in case of default for all loans similar to those of the specific cluster.

Econometric models are designed to "explain" the LGD level on the various credits in default by making explicit the relevant connections between such parameter and the characteristics of those credits; these ties are translated into an estimation algorithm. These LGD estimates may be considered as elements of an LGD continuum scale. In this case, the intermediaries should select the variables in order to avoid cases of "overfitting", and the process of variables selection should be characterized by the highest statistical soundness.

Since in all such cases the opinion of experts complements objective/quantitative criteria – which can lead, for instance, to the inclusion of one or more variables that are not statistically significant but are deemed relevant in the credit recovery process – a set of criteria to be used to integrate such opinions with more objective elements and the documentation of their impact on statistical properties is expected; to this end, it is desirable that the intermediary verify the econometric quality of the model through a routine diagnostic activity.

The diagnostics should include the creation of tests to verify, among other things: the correct specification of the model (functional form, omitted variables, etc.); the hypothesis of homoscedasticity of errors; the absence of auto-correlation. Furthermore, particular attention should be paid to the value assumed by "R^2" (which is the dependent variable's variance

percentage as explained by the set of regressors) and the "adjusted R^2" (correcting "R^2" to reflect the loss of degrees of freedom due to the addition of explanatory variables); such indicator rarely assumes high values given the bimodal shape typical of the LGD distribution.

With reference to the concept of economic loss, the inclusion of costs associated with the recovery process takes particular relevance; intermediaries are expected to include the costs directly attributable to each "facility" (direct costs, whether internal or external); with regard to indirect costs, appropriate methods of allocation should be developed, by referring to the charges set by the control units. The techniques used could be based on simple cost averages or on statistical methods applied to a properly-selected segment of the population of counterparties in default.

As regards the discount rate of positive and negative cash flows, lacking a consensus at the international level, the regulation sets some general criteria. Intermediaries are expected to comply with these criteria, which refer to the consistency of the chosen rate with the typology of exposure it is applied to, the need that it reflects both the monetary value of time and the risk inherent in the volatility of recovery flows, the traceability of logical steps followed with evidence of its rationale as well as strengths and weaknesses.

Construction of the reference database ("Reference Data Set", or "RDS") is probably the most sensitive phase of the entire estimation process, since lack of essential data forces intermediaries to use only those positions for which a complete set of information is available; this sample may nevertheless result distorted, as it is not adequately representative of the whole of the default positions (the randomization and stratification criteria might not be met). For example, low-amount defaulted positions – whose recovery is often outsourced to service companies or law firms – are often not included in the reference dataset as they lack the required information.

Intermediaries should be able to use a really representative sample of default exposures; otherwise, it will be necessary to highlight what portfolio portions are not adequately represented and the reasons for this occurrence. The availability of partial data should prompt a higher degree of caution in the quantification of LGD.

The data collection process should be documented, traceable and closely integrated in corporate processes. It should also:
- be referable to clearly identified people in charge;
- be subject to independent controls, and responsibilities should be clearly identified;
- allow, in principle, accounting reconciliation of aggregates.

In case of integration of data collected automatically with information taken from paper forms, the adoption of the necessary precautions is expected to

ensure the quality of such information; the RDS manual feeding component should however be gradually reduced and, possibly, eliminated.

With regard to "downturn LGDs" and to the LGD for exposures in default, there are still no generally accepted practices for their identification.

With reference to the first aspect, regulation does not provide specific methodological guidance: it is up to intermediaries to define the most appropriate way to evaluate the cycle's influence on LGD, while the robustness of the chosen method has to be demonstrated.

In their estimates, intermediaries are expected to include at least the systematic component of risk and to identify asset classes and geographical areas (in case of cross-border groups) for which there is a statistically significant link with the cycle (like, for example, the "mortgage" portfolio), in full compliance with the general criteria specified in the regulation. In any case, the process of assessing the effects of recessions – particularly if carried out by using interpretative models [12] – should identify and incorporate in the estimates the correlations between:

- default and recovery rates;
- recovery rates and discount factors of recovery flows;
- recovery rates and present value of guarantees.

If the intermediary believes that the current system for managing collateral is significantly different from the system adopted during the reference period of the time series used for estimation of LGDs, it is required to assess the need to make conservative adjustments to such estimates.

With regard to LGDs for exposures in default, the best estimates of expected losses coincide, in principle, with analytical writedowns in the accounts. In that case, any differences between the LGD and the best estimate of the expected loss represent, if positive, the capital requirement for such exposure. The difference may be minimal if the recovery risk associated with unexpected losses in the recovery period is limited; this

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[12] A possible classification of models for estimating "downturn LGDs" ("dLGDs") is based on the distinction between:

- representative models, which tend to be constructed from data alone and finalized in finding the best synthetic description of the phenomenon without formulating, as far as possible, explanatory hypotheses. One elementary example is a basic estimate of dLGD at time t, $dLGD_t^*$, obtained as:

$$dLGD_t^* = \varphi_1 \cdot LGD_{t-1} + \varphi_2 \cdot LGD_{t-2} + \ldots + \varphi_p \cdot LGD_{t-p},$$

with $\varphi_1 + \varphi_2 + \ldots + \varphi_p = 1$.

- interpretation models, which exploit *a priori* propositions or knowledge - borrowed the respective study areas – with regard to relational constraints among heterogeneous phenomena. One elementary example is an $dLGD_t^*$ estimate obtained from:

$$Logit[dLGD_t^*] = \varphi_0 + \varphi_1 \cdot Logit[PD_t] + \varphi_2 \cdot Logit[v_t] + \varphi_3 \cdot Ln[W_t]$$

with PD_t, v_t and W_t, respectively, the probability of default, the (single) discount rate of flows and the value of guarantees supplied at time t.

might occur, for example, when the intermediary has an adequately liquid guarantee, which it already owns and could be sold in a very short time.

LGDs for exposures not in default may not, in general, be seen as the best estimate of expected losses, since these should be calculated with regard to the current phase of the economic cycle and the current status of the exposure, which has obviously changed having the default occurred; there is therefore no specific relationship that could be generally established between ante and post-default LGDs.

(text omitted)

II.2.7 Quantification of risk parameters: CCF

(text omitted)

II.2.7.2 Expected firm practices

For exposures consisting of off-balance sheet assets in the form of guarantees and/or loan commitments, the EAD is determined by adding to the amount currently drawn the undrawn balance multiplied by appropriate credit conversion factors (CCFs). For these exposures, intermediaries with advanced IRB systems use internal estimates of CCFs rather than the regulatory values. Therefore, although the regulatory parameter to be estimated is the EAD, regulation provides for its calculation by estimating the relevant credit conversion factor.

The CCF estimate is obtained from CCFs realized from exposures in default stored in the reference database. Intermediaries may use different approaches for determining the realized CCFs; such approaches are based on the observation of exposures at a specific date preceding the time of insolvency (reference date) and differ in how this date is chosen.

In theory, at least three different approaches are possible:

- a fixed time horizon, where the observation period prior to default is a fixed period, conventionally defined, usually equal to 12 months;
- a variable time horizon, which allows to follow, for the entire period of observation, the evolution of exposures going into default through various periodic windows, e.g. monthly (one-month, two-month windows and so on up to 12 months);
- for cohorts, in which all exposures going into default during the reference year are taken into account.

The fixed time horizon approach, on the one hand, unambiguously guarantees a 12-month time horizon and the homogeneity of treatment of realized CCFs; on the other, it does not allow to consider for estimation purposes the exposures that have arisen and deteriorated within the time horizon in question. Furthermore, and more generally, this approach is based on the simplifying hypothesis that, for all the exposures considered, the default is recorded at the end of the reference period.

The variable time horizon approach, which is in fact a generalization of the previous one, allows having a greater number of observations on which to build a synthetic indicator (average, median, mode, etc.).

The cohort method has a time horizon on average equal to half the time frame of cohort observation.

In general, it has to be highlighted that – even once one of the approaches mentioned above is chosen – building estimate samples for CCFs may be characterized by a number of particularly complex factors (see Annex II/3).

The estimation methods may be different: multivariate analysis, mathematical optimization methods or, simply, segmentation processes (of statistical and/or expert kind) and "look-up tables" that allow calculating average long-term CCFs for different typologies of exposures. In the latter case, the average should not be weighted on the size of exposures: as for the LGD, the possible effect of size should be treated by segmenting the averages by size ranges rather than weighting the CCFs by the amounts.

CCF estimates should take into account all relevant risk factors. Although it is not easy to identify a minimal set of relevant variables to be considered [13], reference should at least be made to i) the characteristics of the exposure (loan type, guarantees, maturity, size), ii) the factors influencing the demand for funds by the debtor (type of counterparty, rating, presence of other creditors alternative to the intermediary), iii) the internal procedures for the daily monitoring of credit amounts (i.e. changes and outflows).

Other relevant aspects, such as the characteristics of the reference database, accounting for economic downturns in estimates and the necessary caution factors, follow the same logical criteria discussed for LGD. Analysts may therefore refer to the practices there highlighted whilst taking into account the necessary adjustments resulting from differences in the parameters.

In general, intermediaries should ensure an intrinsic, overall consistency among defining and methodological choices underlying the estimates and those made for calculating the other risk parameters (PDs and LGDs). In particular, where the estimate of LGDs does not incorporate any subsequent drawing of credit after default, these should be included in the CCF estimate.

(text omitted)

[13] The difficulty stems from the lack of agreement within the banking industry and academia, as well as from the fact that the risk factors mentioned above are affected by the intermediaries' specific situation.

II.2.8 Risk parameters quantification: cure rate

(text omitted)

II.2.8.2 Expected firm practices

The introduction of "cure rates" in the LGD estimate is particularly significant when LGD is estimated by only using the positions that have not cured.

The estimate of the "cure rate" can be performed separately on samples that share the same typology of default or, in multivariate models, the type of default may become part of the explanatory variables. In any case, the assessment method should produce results consistent with the fact that the recovery rate is between zero and one; negative or greater than one "cure rates" are therefore not acceptable.

Intermediaries are expected to exclude from the sample used for estimate all “technical past due” positions, made up of credits that are past due and/or overdrawn, and possess all the characteristics necessary to be included among the exposures in default but do not reflect an actual state of difficulty on the part of the obligor such as to generate losses.

The extension of the cases that contribute to the definition of exposures in default has a decisive influence on the estimation of risk parameters, particularly the LGD.

Such extension may indeed cause the inclusion in the database of positions for which a recovery process has not been observed since they were not characterized by situations of actual pathology: for these positions, LGDs tend to zero, so that the final effect may be an underestimation of loss rates.

Conversely, an increase in the PD estimates which could compensate for any underestimation of loss rates may be observed. However, capital requirements calculated under the regulatory formula appear to be more sensitive to changes in LGD than in PD. This asymmetry may result, within the advanced IRB approach, in significant reductions in capital charges unrelated to the actual ability of intermediaries to limit losses on exposures in default.

(text omitted)

II.2.9 Stress tests

(text omitted)

II.2.9.2 Expected firm practices

Stress tests should be developed by intermediaries in accordance with their scale of operations, the sophistication of their business and the degree of portfolio diversification. Stress testing should include, inter alia, the segmentation of portfolios depending on the specific characteristics of each segment, the identification of risk factors relevant to each scenario (e.g. through a "bottom-up" type analysis), the construction of specific scenarios and the determination of the impact of each of them on the portfolio in question, and, lastly, the analysis of results [14].

In the formulation of the scenario analysis two distinct approaches are normally found: in the first one, with the existing asset portfolio as benchmark, the analysis tries to understand what changes in the risk parameters of the internal system could cause losses and what events could lead to such changes through modifications of the risk factors ("portfolio-driven approach"); in the second one, an event (usually of "macro" nature) capable of significantly modifying one or more risk factors (for example, a sharp and sudden change in the exchange rate or the yield curve) is identified, and an attempt is made to estimate the impact that changes in risk factors may have on the internal system risk parameters ("event-driven approach"). In both cases, the stress scenario is a set of assumptions about future economic conditions that have low probability of occurrence but would lead to high losses should they occur: the process is based on the relationships among events, risk factors and risk parameters.

The intermediary is expected, within the area of scenario analysis, to carry out stress tests according to methods based on historical, hypothetical and specific scenarios, whilst preceding the various approaches with a survey of their own vulnerabilities and an analytical description of the portfolios' nature and composition.

A. Historical scenarios

Historical stress scenarios describe crises that have occurred in recent history (for example, the stock market collapse of 1987, the fall of bond prices in the first quarter of 1994, the Asian crisis of 1998, the crisis of the "subprime" market of 2007-2008), whose hypothetical effects on the current portfolio are examined. Building historical scenarios does not prove particularly effective whenever structural changes in the operations of intermediaries or modes of functioning of markets make it unlikely that what happened in the past could be repeated in the future.

[14] The analysis of results may require a comparison between stressed and empirical distributions of risk parameters, the identification of specific vulnerabilities, the economic consistency of results, and so forth.

B. Hypothetical scenarios

Scenarios that bring together the most severe changes in risk parameters, whilst taking into account data observed in the past, are expected to be built. While the historical scenarios are easier to formulate and understand, hypothetical ones allow the modification of the common tendency to give more weight to past events than to the dangers that may occur in the future, and represent a more flexible instrument to select extreme, although plausible, adverse conditions. They describe "extreme" but still possible situations, defined subjectively, also according to their significance in current conditions. However, as they are mostly beyond past experience, it is more difficult to assign a probability to the occurrence of an event. Among the hypothetical scenarios is the "minimalist" one provided by the regulation (two consecutive quarters of no GDP growth).

C. Specific scenarios

Intermediaries are expected to develop such scenarios whilst taking into account the qualitative and quantitative composition of their portfolios, especially in terms of concentration by counterparty, product, sectoral/geographical area. For example, exercises of this kind link the event of potentially significant losses with specific events (e.g. bankruptcy or major difficulties for one or more significant industrial or financial counterparties, etc.), thus allowing to better understand the potential vulnerabilities of the portfolio as well as envisage actions aimed to counter the negative consequences of such events on capital adequacy.

For an effective use of stress tests, intermediaries should take into account the simultaneous changes in risk factors that they deem relevant. It also appears essential to ensure the internal consistency of the proposed scenarios.

In all mentioned cases, stress tests should allow to assess the effects of changes in risk parameters – probability of default (PD), loss given default (LGD), credit conversion factors (CCF) – caused by the assumed shocks on risk factors. To identify shocks to be applied, both quantitative methods (e.g. forecast econometric models) and approaches of a subjective nature may be used.

In this regard, it should be noted that if intermediaries, while designing the internal system, follow an approach close to the "point-in-time (PiT)" philosophy in the stage of rating attribution and of quantification of PD, then stress tests also achieve the goal of recovering the size of adverse conditions at the portfolio level. As a matter of fact, in a “PiT”-type IRB system, the evaluation on a given entity’s future solvency is given through the assessment of both the entity’s current and prospective economic and financial conditions and the economic cycle’s current and prospective conditions. In this sense, it is therefore likely that – the examined entity’s

specific conditions being equal – a recessive economic cycle will go along with worse ratings, and vice versa.

By contrast, in a "through-the-cycle (TtC)" IRB system the evaluation concerning solvency is made independently of the current and perspective business climate and rather considering a pessimistic scenario. In other words, the analysis of the entity's ability to fulfill its obligations is carried out through a sort of stress test which assumes the worst conditions of the cycle.

For those reasons, in case PD estimates do not incorporate adverse conditions, intermediaries should pay more attention to how to conduct stress tests in relation to this risk parameters.

Very important are the mechanisms for internal communication, which may be activated through the stress tests process. Besides a clear and detailed formalization of this process, reporting is expected to allow corporate bodies and structures at various levels to be timely informed of the results, also for the purpose of taking the measures deemed necessary. Reports should at least contain references to supposed events, the shocks on risk factors to which the intermediary is exposed to a greater extent, the impact on risk parameters of the internal system resulting from these shocks, and the effects in terms of capital requirements.

(text omitted)

II.2.10 Validation of the internal system: quantitative aspects

(text omitted)

II.2.10.2 Expected firm practices

The full set of tests carried out within the internal quantitative validation conceptually starts where the development of the internal system ends and is carried out in a complementary and parallel manner with respect to the latter.

Focus should not be on the simple replication of what has been done by the development function [15], but rather on the critical review of the various stages that led to the estimation of parameters, thus ensuring their methodological soundness, as well as the periodic evaluation of the internal systems performance, in order to confirm the continued robustness and validity of the estimates.

[15] It is desirable that verifications of estimates be already made during the development of the internal system. Thus, overlapping should be minimized in the internal quantitative validation by carrying out further analysis.

In-depth examinations should help identify possible sources of error. Potential problems detected should then be discussed with the function dedicated to development, thus feeding a virtuous dialogue aimed at a continuous improvement of the estimates and the IRB system (iterative approach to validation).

According to a conceptual scheme established in business practices, internal quantitative validation consists of two stages: a) revision of the architecture of the internal system; b) measurement of performance.

When the competent unit releases the internal system, the function in charge of the validation is called to assess both methodological aspects and performance. Once the internal system has become operational and is actually used in credit granting and credit management, the validation activities mainly shift to performance measurement.

Opportunity reasons lead in some points to distinguish PD checks from checks carried out on the other risk parameters, not only because of the regulatory approach (basic or advanced) the intermediary aims at, but also as a result of underlying differences characterizing the development of the said parameters, thus making very different validation approaches necessary.

As for PD, there is indeed a general agreement that the models aimed at forecasting insolvencies can be conceptually separated into two stages: first, establishing the score allowing to sort counterparties/transactions in relation to the alleged propensity to default ("rating assignment"), and then a cardinal measure expressing, in probabilistic terms, the likelihood of the event for homogeneous counterparties ("rating quantification"). Conversely, the models for the estimation of LGD and CCF are not subject to this breakdown, since the quantification stage is the only one concerning them. Validation activities are therefore expected, with reference both to the review of the internal system design and to the measurement of performances, to be differentiated according to the above mentioned characteristics.

The validation function is called, finally, to give its opinion on the correctness of stress tests, by monitoring their results and proposing the appropriate modifications as the internal organization and the economic environment change.

(text omitted)

A. The review of the internal system's design

This phase aims to verify the strength of the techniques used in the various development stages, of the underlying hypotheses, as well as the overall consistency of the procedure followed.

In general, despite the variety of possible methodologies variously rooted in statistical or subjective elements, the estimation of regulatory parameters consists in the identification of a single measure of the risk dimension ("insolvency", "loss" or "exposure") due to specific features of the unit being assessed (counterparty or transaction). The internal system likely results from the logical union of several intermediate stages leading from the combination of the initially available variables to the final selection of those deemed optimal [16].

That said, the validation function is tasked with the identification of the design's crucial stages, whose correctness will affect the validity of the final estimates. The following aspects are relevant:

- adequacy of adopted methodologies. The suitability of the approaches used in relation to the sector under assessment and the availability of data useful for estimates is expected to be evaluated [17];
- representativeness of the sample used in the various estimation stages in relation to the reference population. The reliability of estimates in the implementation stages is directly linked to the homogeneity of the estimate sample with regard to the population on which the internal system is used; the representativeness should be assessed in relation to relevant stratification variables (i.e. those explaining a significant fraction of risk) as well as in relation to adopted credit granting and recovery practices, and to the economic cycle;
- building and selecting the indicators. The process of developing a risk classification model is based on the gradual selection, from a large set of variables, of those deemed most relevant for the explanation of the phenomenon, by applying, time after time, more stringent criteria. The validation work should also examine the way indicators are built and selected – in particular with reference to those steps involving subjective assessments – as well as the economic plausibility and interpretability of their relationship with the phenomenon to be explained. Attention should be focused on the statistical and economic

[16] With regard to this, it should be kept in mind that a model's statistical soundness is based on the use, in the individual logical steps, of specific scientific methods resulting in parameters – suited to express the regularity between the phenomenon to be forecast and the explicative variables – enjoying certain desirable properties, i.e. ensure the minimization of expected errors. Notwithstanding this, even a model characterized by the intense use of statistical methods is not devoid of errors. On the contrary, it necessarily contains subjective elements regarding, among other things, the selection of methodologies and the acceptability thresholds of statistical data associated to parameters.

[17] For example, the statistical treatment of qualitative information deriving from questionnaires requires an adequate number of observations and proper plausibility of the answers. The filling out of questionnaires may be requested *ex post*, due to the need to develop a statistical model. It can be assumed, however, that in such cases the answers are distorted by the questionnaire author's actual knowledge of the status of the credit relationship with the counterparty. In such a situation the use of statistical methods might not be advisable as the reliability of answers is strongly impaired.

significance [18] as well as the overall capacity to explain the phenomenon variability;

- completeness of rating. The function responsible for validation is expected to check that all information definitively included is large enough to properly characterize all relevant risk aspects;
- compatibility of external information sources with internal data. The use of external information sources can be motivated with the need to increase the size of samples for estimation with further observations, or to continuously enrich the set of variables used. In either case, the function in charge of validation should pay particular attention to external sources' consistency with internal ones, with special reference to the definitions of default and loss as well as the accounting definitions of the indicators.

In assessing the aspects mentioned above, the validation function should first evaluate the adequacy of the documentation released after the development of the internal system, so as to make it possible to trace the estimation process step by step and evaluate the reasons underlying individual decisions. During the validation activity the possibility of selecting alternative techniques, whose results will then have to be compared with those of the internal system, should be taken into account.

A.1 Specific considerations for PDs

In the estimate of PDs it often occurs that the criteria for identifying a counterparty/transaction's riskiness are selected by separately analyzing the different information sources available (financial statements indicators, position development data, answers to questionnaires). "Partial" modules are then integrated to obtain a single measure, inclusive of all the underlying information. The methods of integration may in principle differ according to weights obtained by statistical or subjective means [19].

In any case, it is expected that during the review this will be properly studied to verify that the methods for integration are adequate to the

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[18] "Statistical significance" means the intensity of the link between the single indicator and the dependent variable (the correlation coefficient is significantly different from zero). The "economic significance" is instead connected to the rationality of the relationship thus identified.

[19] A frequent distinction is between "horizontal" and "vertical" integration. In the first case, each module is developed separately, on possibly different entities. Each module selects an appropriate combination and weighting of variables capable of predicting the phenomenon better than the others. Outputs are then aggregated in a sub-sample including counterparties common to individual modules, also to optimize the final model's performance. However, the overlap between the different samples might be too small to use statistical methods and it is therefore necessary to use subjective modes and weights. In the second case, the integration is carried out through successive steps by using the output of one module as the basic input of the next (for example, the score resulting from the financial statements model becomes a variable in the subsequent one which includes position development information). In this case, the information added step-by-step is used to explain the previous step's remainders. Clearly, the integration order is a key determinant of the final model.

portfolio under consideration and do not determine systematic distortions in the parameters. Moreover, it is important that there is awareness of the weight of each component in the final rating.

The analysis of the dynamic properties of the internal system, namely the variability of judgments in relation to changes in the economic cycle, may be included in the review of its architecture. As already noted (see par. II.2.9.2), two reference categories can be identified according to the "philosophy" underlying the internal system:

- "point-in-time (PiT)", if judgments tend to change rapidly in response to changes in the economic environment. These systems tend to assign considerable weight to the position development variables, able to detect in advance liquidity crises of the entity and are more responsive to changing financial conditions;
- "through-the-cycle (TtC)" if, conversely, the ratings tend to remain stable during the different phases of the economic cycle. In this case, the assignment of ratings is more influenced by the less dynamic variables and often by subjective judgments aimed at figuring out the entity's ability to survive in adverse phases of the economic cycle.

These considerations necessarily extend to the time horizon implicit in the PD associated to the different classes of rating. Although in both cases the probability has a horizon of one year or less, the PDs arising from "PiT" systems refer to the subsequent year, while those from "TtC" systems are calibrated on medium to long-term horizons.

Of course, the mentioned distinction is purely theoretical, in the sense that there are no perfect "TtC" or "PiT" models. In order to verify the dynamic properties of the rating system it is important, however, to know – even approximately – how close an IRB system is to the two aforementioned methods.

Also for this purpose, analysis of rating transition matrices are essential. Validation activities should include the periodic calculation and evaluation of transition matrices to determine the system responsiveness to changes in the economic environment. Transitions are expected to be analyzed on various horizons (at least annual, but also within the year or on horizons exceeding the year). Matrices should then be examined to check the fraction of movements within one, two or more rating classes. The use of robust statistical methods is desirable for carrying out such investigations.

A.2 Specific considerations for LGDs and CCFs

With reference to the estimation of LGDs and CCFs, the most significant problem usually encountered in the operational reality is the scarcity of available data in terms of size, depth and quality of information. To obviate such problems as much as possible a wider use of subjective evaluations is observed (i.e. solutions not adequately backed by empirical evidence).

That said, the function responsible for validation is expected to check the methodological soundness of the internal system, whilst paying special attention to the reasonableness of the rationale at the roots of the procedural steps that involve subjective evaluations, and to assess for each of such steps the soundness of the methodologies used, the significance of parameters and the sensitivity of results to changes in the underlying assumptions.

It should be kept in mind that the evolution of LGDs and CCFs is largely affected – more than the event of insolvency – by the operational procedures adopted by the intermediary. The size of losses depends on the effectiveness of the recovery process implemented after default. Similarly, the dynamics of the exposure depend on the intermediary's relationship with its customers and on its ability to manage recovery actions when adverse circumstances arise.

It appears evident, therefore, that changes in business processes may jeopardize the estimates validity. In such cases, the function responsible for validation should check the estimates resilience to changes in adopted operational practices and the precautions implemented to maintain an appropriate degree of prudence in the parameters.

B. The measurement of performance

This stage aims to check the accuracy, ordinal ability and predictive capability of the internal system.

By accuracy is meant the internal system's ability to separate counterparties/transactions sub-sets in connection with the dichotomic event of insolvency observed *ex post* (discriminating power). The high quality of an internal system, indeed, mostly depends on its ability to discriminate in advance between the default and non-default sub-sets.

The ordinal ability should be meant as the tendency of the internal system final output to classify counterparties/transactions in a manner as consistent with empirical evidence as possible, that is, setting default/loss/exposure estimates tending to be worse (better) when empirical evidence shows the presence of major (minor) riskiness.

The predictive capability refers to the precision of estimates with regard to the event to be anticipated. The smaller the deviations between estimates and the available empirical evidence, the greater this ability.

With reference to this last profile, once a model to predict the amount of risk is developed ("default", "loss", "exposure") and risk parameters are estimated (PDs, LGDs and CCFs), the values actually found in subsequent periods will generally be different from estimates. What matters is therefore assessing whether such deviations are purely accidental (that is if, on average, estimated parameters correctly represent the central tendency of

estimates) or whether these deviations are of a systematic nature (underestimation or overestimation).

The "backtesting" thus represents a crucial moment of the internal quantitative validation because, due to size, systematic nature and direction of deviations between forecasts and actual outcomes, corrective interventions may prove necessary.

Also dealing with the verification of the predictive power, another technique consists in comparing the ratings assigned by the internal system to specific counterparties/transactions with the external evaluations or information of public or private nature ("benchmarking"). Since outcomes of a predictive model may be characterized by a limited number of items, thus not allowing for robust backtesting, resorting to benchmarking techniques is a form of cross-cutting and complementary comparison.

It has to be noted that the evaluation of differences between internal measures and external information sources should take proper account of the special features underlying the latter. Therefore, deviations from the external sources are not a problem *per se* but simply the trigger for further investigation. The task, in other words, is to ascertain to what extent the order of magnitude of detected differences can be explained through the differences that characterize the underlying measures or may constitute a source of error.

Lastly, it should be borne in mind that the practical applicability of "benchmarking" techniques is directly connected with the presence of robust and reliable alternative information sources.

The internal system performance should be checked periodically through "out of time" samples (in addition to "out of sample"), with reference to different time horizons.

B.1 Specific considerations for the PD

The accuracy profile and the ordinal ability can be checked by using various statistical techniques. Among the many metrics in the literature, two graphic inspection tools – very common among intermediaries and immediately interpretable – are included: the "Cumulative Accuracy Profile" (CAP) [20] and the "Receiver Operating Characteristic" (ROC). Two synthetic performance indicators can be obtained from these tools, named respectively "Accuracy Ratio" (AR) and "Area Under the ROC Curve" (AUROC), whose intervals of confidence are known [21]. Under normal

[20] Also known as "Gini curve", "Power curve" or "Lorenz curve".

[21] Other indicators useful to this end are: the "geometric mean probability" (GMP), ranging between 0 and 1 in relation to the model ability to assign the higher PDs to counterparties in default, and the "Brier score",

conditions, a good diagnostical ability requires that the AR grows as the time of default approaches; a different trend or, in general, a less pronounced growth of the model accuracy in proximity of the default event might instead highlight "overfitting" phenomena.

It has to be reminded that the use and interpretation of such measures require the adoption of precise precautions because their comparability is rather limited. In particular, the order of magnitude of the indicators is not independent from the default rate of the portfolio on which they are used and therefore, when applied to internal systems developed on portfolios that have a different risk profile, they do not provide comparable values.

The use of the aforementioned measures is appropriate to evaluate the performance of different specifications of an internal system on the same dataset. Under the assumption that the default rate will not show considerable changes over time, such indicators are also useful to measure the performance of an internal system over time. In the latter case, given that the default rate has always some – even if small – volatility, it is appropriate to refer to the indicator confidence intervals rather than to exact values.

In assessing the predictive power, "backtesting" consists in the comparison of *ex ante* PD estimates and the default rates actually observed for each class of rating. The retrospective analysis of the differences between theoretical PDs and actual default rates should be carried out through appropriate statistical tests, which can be performed both on individual class PDs and on the rating scale as a whole.

The "binomial test" falls within the first category. It is based on a comparison between the number of actual defaults and the theoretical values that may be drawn from a binomial distribution, consistent with the dichotomic nature of the default event.

If carried out separately for each rating class, the test could provide ambiguous guidance on the internal system predictive ability, where only probabilities assigned to certain classes would prove to be statistically significant. In order to overcome this drawback it is advisable to use tests, such as the "chi-squared", which try to assess the model predictive ability by checking for simultaneous significance of PDs associated with different classes of rating.

Widely adopted tests are based on the assumption of default independence, a fact not supported by empirical evidence. The lack of correlation works in a restrictive way, thus leading to the acceptance of

measuring the distance (mean square difference) between the counterparty's probability of default and the sound/anomalous dichotomic variable.

only the best internal systems; conversely, the introduction of a high correlation would lead to reject just the worst ones [22].

The reliability of tests largely depends on the availability of data and, in particular, of defaults [23]. Appropriate repopulation techniques should be used to increase the number of observations (use of a broader time frame; use of data on portfolio segments adjacent to the one used).

If data availability allows it, it may be useful to calculate confidence intervals on historical data to assess value dispersion as compared with the long-term average.

All the aforementioned tests should be the starting point in the definition of "tolerance intervals" of the internal system performance. The width of the range of acceptability and the time horizon should also be set with regard to the internal system characteristics.

Internal systems more oriented towards the "PiT" approach – i.e. more effective with regard to short-term forecasting (normally, one year) – are expected to present default rates for each class of rating characterized by a low inter-temporal volatility. Therefore, checks should be based on limited horizons as well as rather narrow acceptance ranges. Conversely, "TtC" internal systems, which capture the counterparty long-term riskiness, are characterized by greater volatility of default rates for each rating class (related to the economic cycle). In this case it is reasonable to make quantitative checks on medium-term horizons, whilst admitting the possibility to observe wider deviations from the expected central trend.

On the organizational level, internal rules should address situations where the values deviate from the estimates of risk parameters to such an extent that the validity of the estimates themselves is called into question. The definition of the aforementioned "tolerance ranges" – i.e. the extent of deviations from the precise estimate of the parameter that may be considered as statistically reasonable – satisfies this need. Intervals should be sufficiently conservative.

The function responsible for the validation should set an evaluation grid according to the size of deviations, associating the adoption of progressively stringent safeguards to each result. Observations outside the expected ranges should lead, if small, to deeper analysis or, if wide and/or

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[22] The “default correlation” should be identified separately. This parameter is, however, difficult to estimate. In general, it is close to zero on retail counterparties and tends to grow along with the counterparty size (exposure to systemic factors).

[23] The amount of data used for the actual implementation of the above mentioned tests is a crucial element for the reliability of results. Although minimum values cannot be set in advance, it should be pointed out that many of these techniques are (more or less deeply) based on the asymptotic convergence of the underlying distributions towards known and easily treatable functional forms. In general, the amount of data should be large enough to ensure that the standard error of the estimator used is adequately small, so that the summary statistic is contained within acceptable intervals.

repeated, to a new estimate of the parameters or the development of a new internal system [24].

As regards "benchmarking", in case the evaluation issued by an external source and the default rates observed on the related rating scale for medium-long periods are available even for a subset of counterparties in the portfolio, the comparison could be made by using both the categorical analysis of data and the study of the distributions of PDs available from different sources [25].

The first approach focuses on the examination of the joint classification of counterparties. From a methodological point of view, the problem can be tackled by using contingency tables, where the dual classification of examined subjects tested under the two compared systems is represented. The higher the tendency to classify the same counterparty in a similar manner, the greater the internal system consistency with external assessments [26].

Instead, the study of PD distributions allows to estimate the probabilistic distance between two systems of risk measurement. Under the assumption that the definitions of default underlying the two measures are uniform, the distribution of differences is expected to be centered around zero and strongly concentrated on close values [27]. The presence of strong asymmetries in distributions and/or "outliers" may form the basis for in-depth analysis of the reasons for the observed deviation. Conversely, when there is no uniformity in the definitions of default, the distribution cannot be centered on zero but through its study it will nevertheless be possible to identify elements for further analysis [28].

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[24] These remarks, valid for the final output of the internal system, might be extended to all its components (modules). It might be useful, in particular, to measure the performance of the ”pre-override" and "post-override" internal system, in order to verify that the subjective intervention constitutes, at least on average, a real improvement in the accuracy of the system itself.

[25] For an effective “benchmarking” it is necessary to know the main features of the external evaluation system, in order to appreciate the reasons for any deviations.

[26] In this case, the contingency table is nothing but a double-entry table with lines for the internal rating scale and columns for the external one. The "cell" located at the intersection of the *i*-th line and *j*-th column indicates the number of entities simultaneously classified in the *i*-th class by the internal system and in the *j*-th class by the external one. The similarity between the two assessments is high if observations tend to be concentrated along the diagonal of the table (although it is inappropriate to speak of diagonals in case of non-square matrices). The described approach is, to a certain extent, independent from the adopted definition of default.

[27] This hypothesis can be formally checked by using various tests on the central tendency of a distribution (for example, the test "*t*" or the "Wilcoxon" one).

[28] In such a case, studying the joint development of risk measures through a linear regression might prove useful.

"Benchmarking" may prove a useful method of validation for "low default portfolios" [29], where there is adequate external information available (as, for instance, in the "large corporate" segment). Under this approach, the ordinal measures of association can provide useful summary statistics for the assessment of the internal system predictive power.

For portfolios of assets characterized by a limited number of defaults, intermediaries are expected to apply to the validation of risk parameters an appropriate degree of caution and devote particular attention to qualitative analysis techniques. A desirable solution is to use a variety of techniques to verify that all of them converge towards the same conclusions.

On the organizational level, considerations analogous to those already expressed for "backtesting" may be made also with regard to "benchmarking". In particular, intermediaries could define intervals, characterized by different levels of seriousness, around punctual estimates, taking into account the increased difficulties encountered in the application of these techniques, for the reasons mentioned above.

B.2 Specific considerations for LGDs and CCFs

The "backtesting" of LGDs and CCFs should take into account additional factors related to the estimation of such regulatory parameters. Regulation indeed requires that estimates be based on long-term averages, or be "stressed" to account for negative stages of the economic cycle ("downturns"). Therefore, a direct comparison between forecasts and the manifestations of the phenomenon might prove unfeasible, as the manifestation of the event is necessarily "point-in-time".

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[29] According to the most commonly used definition, "low default portfolios" are identified as homogeneous groups of exposures (to natural or legal persons) whose default rate is zero or so close to zero that the estimates of risk parameters based on historical experience of insolvencies are not reliable or statistically not significant.

As to the reasons underlying the presence of a limited number of insolvency events, portfolios are usually distinguished according to the basis for their "low default" nature:

- structural, if the phenomenon lacks due to the high credit quality of counterparties or the existence of a low number of counterparties. In such cases, the problem of the structural unavailability of data becomes systemic as it is common to all counterparties variously involved. Segments such as central governments and central banks, supervised intermediaries, "large corporate" and "project financing" are normally included in this category;
- relative, because the scarcity of events is related to factors such as the intermediary's limited activity, a limited time horizon available or specific characteristics of the product combined with other factors. In this case, data problems are linked to intermediary-specific reasons and do not assume a general relevance. Such difficulty may concern: intermediaries that recently entered a specific market or introduced a new product; intermediaries specialized in certain categories of low-default-rate products, as those distributed to particular groups of customers (such as loans to civil servants backed by salaries).

It is also necessary to consider that the LGD estimates (forecasts) – being based on a concept of economic loss – also include indirect costs, not available from data on recoveries. Furthermore, the "backtesting" of the "workout LGD" is naturally delayed by the length of the recovery process.

Within the "backtesting" of LGDs and CCFs, the presence of anomalous observations (for example, negative or higher than one LGDs) should be monitored, making sure that their impact does not increase over time with respect to the estimation sample.

(text omitted)

II.2.11 Using vendor models

(text omitted)

II.2.11.2 Expected firm practices

Regulation excludes the possibility for intermediaries to use external IRB models in an "automatic" and unaware manner, whilst requiring virtuous behaviors in order to reduce the degree of information asymmetry with external suppliers on acquired components.

The onus of proving to the Supervision the compliance with regulatory requirements of the models used lies with the intermediaries and this fact, in general, pushes them to ask suppliers for the broadest possible disclosure on the functioning of models.

The decision to use a model developed by an external supplier should necessarily result from preliminary assessments of its modes of operation and adequacy with regard to the reference portfolio [30].

The external model is appropriate inasmuch that it is sufficiently representative of the intermediary's portfolio. The reference is given by the target population rather than the development sample, because the latter could be balanced and therefore it could present by construction no statistics comparable to those calculated on the total portfolio and be inconsistent with the way the external model is used in the internal system.

The adequacy to the portfolio should be assessed through appropriate statistical tests based on the comparison between – on the one hand – the distributions of some classes of data from the supplier's population and the intermediary's portfolio and – on the other – some "stratification variables". For each of these variables, the distribution of borrowers in the vendor

[30] Generally, there is variability in the use of external models within the framework of IRB systems developed by intermediaries. They can be used both in the rating attribution stage and in the quantification of risk parameters, as well as to perform "benchmarking" analysis.

model should be sufficiently aligned with their distribution in the intermediary's portfolio.

Intermediaries cannot restrict themselves to an "automatic" use of the external model; instead, they have to develop specific skills aimed at better understanding it – also in order to "intercept" any signs of specific problems and/or obsolescence – check its performance and look for new indicators which might lead to improvements to the internal system in terms of predictive capability.

A responsible use of the external model and the awareness of its functioning mechanisms imply the full knowledge of: how to pre-process data, with particular regard to "missing" inputs and handling of "outliers"; data quality monitoring techniques; the contribution of possible adjustments introduced by the supplier; the implementation of any transformations; variable selection techniques and chosen indicators, as such steps may have significant effects on the estimates of the model parameters.

In general, compliance with these requirements is limited by the suppliers' obligation to protect the economic value of the intellectual property incorporated in the model, as well as the data underlying the model itself, which would suffer a considerable reduction in case of release of full information about their structure and functioning.

For this reason, a partial exemption is granted where the external model is used to complete a broader internal system and intermediaries prove that excluding the external component from the internal system does not reduce its performance in a decisive way.

In such cases, one of the intermediaries' first duties is to establish criteria for determining that the external model is not crucial to the internal system. This should be supported by quantitative analysis aimed at estimating the external model's contribution in terms of overall performance of the internal system in which it casts. Typically, where external models are integrated into a broader internal system that processes position development information from an internal source, the external models generally result crucial in credit granting, whereas the internal system's remaining part is crucial in the following phase of exposure monitoring and control [31].

[31] In case of external models suitable for the "retail" segment, which are predominantly based on scores of external credit bureaus in the first acceptance stage (when the availability of other information to assess the riskiness of the client and/or operation is typically limited), the score's relative contribution appears crucial for the quantification of the counterparty and/or operation risk; to avoid a restrictive interpretation of the rule, which might lead to deny the suitability of these models as components of an internal system, it has been acknowledged that, in such cases, the preponderance of external models in the credit granting phase has to be linked to an objective lack of useful information for assessing the customer's or transaction's riskiness, rather than to intermediaries giving up the development of internal methods of evaluation. The principle of assessing the external model's significance with reference to all the phases that make it up, rather than to each one of them, has thus become explicit.

In case it is proved that the external model is not crucial, the intermediary's lack of knowledge of the data subject to confidentiality by the supplier (typically, algorithms and socio-economic variables) can be considered acceptable provided that knowledge of the main aspects, underlying logic and type of information used in the external model is required.

The integration of the external model in the internal system may present significant levels of complexity associated with the heterogeneity of the samples for estimation and the consequent use of different average default rates. Therefore, before proceeding with the integration of the external model with other modules built in-house, the intermediary is expected to calibrate the default rate of the external model to that of the other modules that make up the integrated model [32].

Another crucially important aspect relates to possible differences in the definition of default adopted by the intermediary and the external supplier. Such a circumstance may be accepted provided that both definitions of default, possibly after the necessary adaptations, are consistent with the regulatory one.

Pursuant to regulation, the external model should be subjected by the intermediary to an internal validation process [33] to assess the accuracy of estimates and to form an opinion about the external model proper functioning and predictive power.

The main purpose of the validation process is to contribute to the continuous improvement of the internal system. This requires that the intermediary defines internally the tests necessary to measure the external model performance and predictive ability, as well as the tolerance thresholds for forecasts to be considered valid.

Like the models developed in-house, the internal validation procedure of the external model should be documented and formally approved by the senior management, and follow the same logical steps envisaged for the internal system's validation (general and quantitative).

The intermediary is required to ensure the model functioning and validation even in case the business relationship with the external supplier is terminated.

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[32] The estimate of an external model is carried out by using samples whose riskiness is, in general, different from the one implicit in the internal models estimation samples. The implementation of the external model on the intermediary's estimation samples would distort results, because the external model parameters would absorb the estimation samples default rate. Calibration methods are used to correct such distortion.

[33] Unless the external model is integrated in an internal system and the non-crucial role of the former in the overall performance is proved. In this instance, the external model validation may be included in the validation of the overall internal system.

Practices specified in relation to the outsourcing of business functions are valid here, to the extent that they are applicable (see Part 1, Section III, par. III.11.1).

(text omitted)

II.3 Information systems

(text omitted)

II.3.2 Expected firm practices

Given the importance that reliable information systems have for measuring credit risk and calculating capital requirements by means of an IRB system, for each of the four relevant areas the intermediary is expected to implement actions that are strictly consistent with what is detailed in the regulation.

(text omitted)

II.4 Specific portfolios

II.4.1 Specialized lending

(text omitted)

II.4.1.2 Expected firm practices

The economic structure of specialized financing is very different from that of ordinary lending, to the extent that their repayment depends on the soundness of the financed project and its cash-generating ability.

On the other hand, such operations are generally part of portfolios characterized by a limited number of large-amount transactions, the low number of which may make it very complex to create time series of risk parameters; for this reason an alternative system has been devised, based on regulatory classification criteria ("slotting criteria").

Three alternative approaches for the sub-class of specialized lending are offered to IRB intermediaries:

- the advanced IRB system, if they are able to estimate PDs, LGDs and EADs;
- the foundation IRB system, if they can only estimate PDs;
- the "slotting criteria" approach, if they are unable to estimate any risk parameter.

The three approaches are not equivalent in terms of capital requirements: being the evaluation equal, the methods based on risk parameters tend to produce lower capital requirements than those produced by the "slotting criteria", particularly for high-standing operations.

With regard to IRB systems, two groups of methods have emerged: the first, of a quantitative nature and based on simulation techniques, essentially consists in adapting the evaluation schemes adopted by "front desks" to "risk management" purposes and uses models whose direct output are the risk parameter values for each operation; the other group, qualitative in nature, is based on judgmental assessments made by experts on more or less structured pre-defined evaluation grids and allocates risk parameter values only indirectly, usually through a "mapping" to other rating scales.

In the first instance the models are very complex and based on a considerable amount of assumptions both in terms of the main features of the project (especially the expected cash flows) and the evolution of the relevant market risk factors (interest rates, exchange rates, commodity prices, etc.); the high complexity and the large margins of discretion – which make these systems very fragile and significantly exposed to model risk – are counterbalanced by obtaining risk parameter estimates directly.

The second group of systems hinges on the quality (in terms of expertise, experience, professionalism) of teams of experts responsible for the evaluations and, if the quality is sufficient, it may allow a better control on the discretionary margins inherent in the evaluation process; on the other hand, it does not *per se* guarantee a sound pegging of risk parameters to internal valuations.

(text omitted)

II.4.2 Equity exposures

(text omitted)

II.4.2.2 Expected firm practices

Pending the establishment of specific practices for this type of exposures, given the similarity with the VaR techniques used for the calculation of capital requirements for market risks, reference may be made to the expected firm practices set out in Chapter III of this Section.

(text omitted)

II.4.3 Securitization positions

(text omitted)

II.4.3.2 Expected firm practices

The use of the SF requires the estimation of five input parameters concerning:

a) the tranche to which the held position belongs, namely:

- the thickness (T), i.e. the tranche amount;
- the credit support level (L), i.e. the nominal amount of all tranches subordinated to the one to which the intermediary's position belongs;

b) the securitized portfolio, namely:

- the actual number of assets constituting it (N) [34];
- the capital requirement calculated through the IRB method (foundation or advanced) added to the expected losses ("K_{IRB}");
- the mean loss rate in case of default weighted by the securitized assets (ELGD).

Parameters T, L and "K_{IRB}" must be included in the formula as a percentage of total securitized assets.

[34] N should be calculated by using the following formula: $(\Sigma\ EAD_i)^2 / \Sigma\ EAD_i^2$, where EAD_i is the sum of all assets to the i^{th} obligor. A simplified calculation is envisaged if the largest securitized asset does not exceed 3% of the sum of the amounts of all securitized asset (i.e. in case the securitized portfolio is granular).

CHAPTER III
Market risks

III.1 Organizational requirements

III.1.1 Role played by the supervisory, management and control bodies

(text omitted)

III.1.1.2 Expected firm practices

Refer to par. II.1.1.2. The indications provided therein should be interpreted in relation to the profile of the market risk measurement system.

If market risk taking in the group is concentrated in a specialized intermediary, without prejudice to the parent undertaking's responsibilities (decision to adopt the internal system, its functionality, and group approach to risk), the bodies' role is assessed with reference to the "investment bank".

(text omitted)

III.1.2 Structure and procedures to perform line controls

(text omitted)

III.1.2.2 Expected firm practices

To ensure correctness and completeness of data on individual transactions, their recording in the corporate information system, particularly for instruments not listed on electronic trading systems, is expected to be preferably performed by the "middle-office" structures supporting the activity, rather than traders.

Normally, traders input the operation characteristics in the corporate information system or in the electronic trading system procedures (pre-confirmation stage), whose internal consistency is checked by the above-mentioned "middle-office" units on the basis of paper evidence.

External consistency is instead checked by the "back-office", directly with the counterparty or by cross-checking the reporting by the market information system. It is preferable that such consistency analysis be completed within the same business day to avoid misalignments at the time of the settlement.

The described procedures have to be enforced strictly on trading of complex financial instruments (e.g. structured ones), for which the cross-check with the counterparty should extend to all salient aspects of the contract (in particular: implicit options, strike prices, periods of observation of the underlying indices, other contractual clauses).

Meeting operational limits requires that the structure has a thorough knowledge of them and of the existing delegation system; so, it is appropriate that these tests be hierarchical in nature and, wherever possible, be automatic within the procedures in use. Normally, the check is expected to follow the principle of "growing safeguard and control" on limit excesses, so that minor excesses may be monitored and brought within the thresholds by the next higher hierarchical level with respect to the trader responsible for the excess. Larger excesses should instead be monitored by the market risks control unit and appropriately brought to the attention of corporate units in accordance with formalized procedures and thresholds defined *ex ante*.

The control of compliance with the limits should take into account the difficulties that may arise from real time calculation of risk parameters (VaR or "sensitivities") used as limits.

In case VaR is not instantly available during the day, sometimes intermediaries use "scenario matrices" to approximate the VaR change due to movements in the underlying risk factors. The matrices are usually prepared in the VaR generating process itself and made available to risk-taking operating units (desks or "trading units") early in the morning, also to properly plan strategies. The scenario matrix is fed during the operational day with the new positions taken.

As to the verification procedures, the limits are monitored by means of reports to desk managers in which summary and detailed information on the riskiness of the intermediary's individual desks is included. Such reports are structured to allow checking the limits.

Intermediaries should formalize the line monitoring system adopted in specific risk management manuals and make sure that they are known by those in charge of individual desks.

(text omitted)

III.1.3 Structure, organization and functions of the market risks monitoring unit

(text omitted)

III.1.3.2 Expected firm practices

The hierarchical and functional independence of the market risks monitoring unit from the trading unit is ensured by an appropriate

placement within the organizational structure. Such layout must clearly emerge from the intermediary's official documents.

In addition to the organizational positioning, the real independence of the monitoring function should also result in an adequate allocation of quantitative and qualitative resources. Considering also the crucial role played by the market risks monitoring unit, adequate resources are necessary to permit – *inter alia* through a level of communication at par with trading units – an effective performance of its activities.

As the market risks monitoring unit is responsible for the quantification of the exposure to overall risks and to individual risk factors, it ensures the completeness and significance of the VaRs produced.

The market risks monitoring unit, in addition to the internal system's development and implementation, should be in charge of – within the management of that system – the maintenance, updating and performance assessment ("backtesting") activities.

In particular, the market risks monitoring unit should be responsible for both validating the theoretical models for pricing of new products and periodically estimating the parameters used by the model (e.g. correlations, volatilities, parameters of evaluation models needing calibrations [1]).

The unit should also be in charge of measuring and monitoring, on a daily basis, the "profit/loss" component of trading portfolios necessary to verify the internal model performance also in support of "backtesting". This activity can be carried out in close functional connection with the unit in charge of providing operational results, if different from the risk monitoring one.

Should certain instruments not have the characteristics required to be included in the VaR estimates, the market risks monitoring unit ensures the establishment of appropriate safeguards to provide an estimate of the associated exposure (scenario analysis, stress testing, "à la VaR" measures, etc.).

Jointly with the other corporate functions in charge, the market risks monitoring unit proposes, for approval by the management body, the allocation of VaR limits for the entire intermediary and the various trading units, in line with the methodology adopted, the operational structure of trading units and the allocated capital.

[1] In the presence of pricing models needing calibrations, an activity often characterized by manual actions and subjective choices, the market risks monitoring unit is expected, if not directly tasked with the performance of this activity, to be able to ensure and verify that the calibration is carried out according to set procedures and minimum frequency and is performed in accordance with the criterion of independence from risk-taking units (e.g. by a third unit or the middle office).

The market risks monitoring unit is responsible for verifying compliance with those limits. This activity should not necessarily extend to all types of limits used; it may also relate only to those expressed in terms of VaR. Anyway, the market risks monitoring unit should be able to verify all operational limits used by the intermediary.

Checks on compliance with VaR limits are expected to be carried out through intra-day controls.

Top management is informed by the market risks monitoring unit of any breaches of operational limits authorized by the management. At the same time, in view of subsequent determinations, the unit reports to the management all present and prospective situations of risk which, in relation to the development of markets and the set principles, may emerge as deserving special attention. Any excesses of VaR limits should be promptly brought to the attention of managers at the different operational levels, as specified in the internal procedures (recipients, mode of transmission, etc.). Breaches of the total VaR limit should be promptly brought to the attention of the body in charge of (or delegated to) ordinary management tasks.

Reports by the market risks monitoring unit should be differentiated as to contents and frequency of submission in relation to the level of the managers examining them. The market risks monitoring unit should produce reports for operational structures at least on a daily and weekly basis. The daily reports aim to monitor day-to-day risk exposure of individual desks and the portfolio as a whole as well as assess compliance with VaR limits. Weekly reports provide those in charge of individual desks and managers of the Finance Area with a comprehensive picture of the risk profile and its evolutionary trend by highlighting:

- VaR measures at various levels of aggregation;
- the absorption in relation to the set limits;
- the analysis of the main determinants of the risk profile evolution;
- the information on portfolio composition development;
- the analysis of portfolio sensitivity to the various risk factors;
- stress test results.

Weekly reports should be discussed by the market risks monitoring unit with the heads of the trading units in dedicated meetings.

Less frequently (monthly or quarterly) the market risks monitoring unit should prepare informative reports also for the bodies responsible for the ordinary management of intermediaries (e.g. the CEO).

In addition to periodic reporting, the market risks monitoring unit should also carry out targeted analysis to meet specific needs for in-depth study and monitoring of portfolio risk profile.

Maintenance and update of the information systems used for operating the internal system may be assigned to the market risks monitoring unit, particularly in cases where the critical operational mass allows it. This may make maintenance and update of such systems more effective and timely, but requires the availability of additional resources exclusively devoted to such tasks.

Given the tasks assigned to it, the market risks monitoring unit should play a central role whenever activities in new products/operational sectors are started. In particular, the unit is expected to have clear responsibilities in establishing and/or verifying and validating pricing models to be used for new products, by stating its own independent assessment of the specific evaluation and measurement problems of the related risks.

(text omitted)

III.1.4 Policies and procedures for measuring and monitoring market risks and documentation on the internal system

(text omitted)

III.1.4.2 Expected firm practices

Documentation should cover all processes and activities associated with the internal system, describing the procedures and techniques used in the measurement of market risks, such as the description of VaR and pricing models, the hierarchy of sources, the "backtesting" and the stress tests.

The procedures documentation system needs to be periodically updated and approved procedures shall be adequately distributed to the entire company staff.

Due to their impact on the measurement of risks, special importance should be attributed to the processes that: a) govern the entry into new operational segments and the launch of trading in innovative financial instruments ("New Products Procedure"); b) regulate the introduction and release of new pricing models.

All activities concerning the performance of second-level monitoring should be described and regulated in the manuals concerning management procedures and risk monitoring.

A. New Products Procedure

The New Products Procedure aims to establish the rules by which the various units of the intermediary interact at the introduction of a new product or the entry into new markets or business areas in order to ensure proper risk management, appropriate accounting and adequate pricing.

The Procedure may envisage the existence of a Committee for New Products, composed of representatives of the various units involved (senior

management, managers of operating units, market risks monitoring unit, accounting unit, prudential returns unit, information systems unit, internal audit), which are conferred the responsibility to provide formal authorization for the distribution and placement of the new product by the commercial network.

The definition of “new product” should also include the instances of "significant" change in the features of the products already approved.

For particularly complex/new products, or in the case of entry into new markets or launch of innovative segments, the procedure should envisage the involvement of the supervisory body.

All units concerned should be involved in checking the impacts on their activities and be called to promptly expound a written opinion to be discussed within the Committee.

B. Procedure for the development and release of new pricing models

The procedure for the development and release of new pricing models aims to identify the responsibilities and competences of the units involved in the development and validation of valuation models, and to set the minimal documentation needed for decisions.

The procedure should ensure that, in the absence of an "approved" pricing model, traders cannot take position on the products concerned. Moreover, formally approved pricing libraries should be formalized and available for the front office.

The process of development and release of new pricing models should involve at least the following firm functions: the IT, to assess their technical feasibility; the front office traders, to check the model adequacy (correct valuation of products, effectiveness of the hedging strategy); the market risks monitoring unit for the model testing; the middle- and back-office units and the accounting unit for the aspects of respective competence.

(text omitted)

III.1.5 Use of the internal system for management purposes (“use test”)

(text omitted)

III.1.5.2 Expected firm practices

The internal system should provide the basis for the determination of operating limits to be monitored on a daily basis. These limits should be set in terms of "value at risk", in line with the methodology underlying the internal system. Also the intra-day limits, often set in the form of maximum

tolerated "sensitivities", should be consistent with the corresponding VaR limits.

Operational limits specified in terms of VaR should be allocated with reference to the overall portfolio and the different areas of operation.

The determination of limits should be based not only on historical observations, but also on sensitivity and scenario analyses which would allow ascertaining the adequacy of limits in extreme market situations.

An indication of the internal system actual use is given by the fact that it covers all the portfolios and positions generating market risks. Should this be impossible because of the system limitations (for example, in the case of barrier options in models with partial re-evaluation) or of the degree of liquidity/observability of risk factors (for example, in the case of underlyings such as inflation or correlation), the market risks monitoring unit should be aware of this fact and adopt the necessary safeguards to integrate the overall vision of the risk with alternative measures (such as scenario analysis).

Besides VaR limits, "stop loss" limits may be used, as well as other types of limits based, for instance, on "sensitivity" measures (in terms of, for example, exposure to delta, gamma and vega risks), enabling trading managers to promptly monitor the developments of the risk profile[2].

Sensitivity limits are expected to be calculated with the same pricing model used for the calculation of VaR and built in a manner consistent with VaR measures. In particular, it is expected that at least either the adequacy of VaR with regard to “sensitivity” limits is guaranteed and monitored over time or non-compliance with the VaR limit despite compliance with the corresponding limits in terms of "greeks" is excluded.

Corporate bodies should assess the adequacy of operational limits at least annually or whenever significant operational changes occur due to the entry into new business segments or to changes in the features of evaluation models or VaR.

The degree of integration of the model with the operational activity is demonstrated by the fact that the pricing functions adopted for "front office" evaluations coincide with those used in the internal system. Should this not be possible, the convergence of the different assessments should be ensured and monitored over time.

Also, the measures given by the internal system are expected to be put at the basis of the process to determine the economic capital and its allocation to trading units. The capital allocation process should also take

[2] The use of sensitivity limits is often justified by the fact that VaR limits are usually monitored with a one-day lag due to technological constraints that do not allow their real-time calculation; sensitivity limits are more easily calculated by means of the functionalities normally present in the "front-office" systems.

into account the evidences resulting from the stress tests program adopted by the intermediary.

The measurements of the internal system should become part of the reporting on risk presented by the market risks monitoring unit to the various recipients.

(text omitted)

III.1.6 Internal system validation

(text omitted)

III.1.6.2 Expected firm practices

The validation criteria concerning goals, timing and units in charge should be explicit and documented.

The solutions on its organizational positioning depend on the intermediary's structure and characteristics (inclusion in the market risks monitoring unit of a "model testing" unit in charge of reviewing not only the pricing models adopted, but also the internal system; use of "in-house" models or purchased packages), on the activity carried out (development of sophisticated innovative products; groups with geographically highly-differentiated activities) and human resources available. Although a simultaneous presence of the development and validation functions in the market risks monitoring unit is acceptable, the independence required by regulation between the stages of development and validation needs to be guaranteed.

Moreover, an independent monitoring of the validation process by the internal audit function should be ensured. This function should proceed to an overall examination of the entire risk management process, including validation. This requirement is particularly relevant where development and validation are carried out by the same operating unit.

In order to ensure that the internal system is statistically correct in its theoretical foundation, the function responsible for validation is expected to verify that the assumptions made are appropriate and do not underestimate risk.

As an example, assumptions to be verified may include:
- the hypothesis of normal distributions;
- the number of risk factors with respect to the depth of time series for the estimation of the variance/covariance matrix;
- the use of the square root of time to shift from a one-day to a ten-day time horizon;
- the use of interpolation or extrapolation techniques to build functions and/or time series;

- the chosen level of granularity in the description of risk factors;
- the assumptions underlying pricing models.

As to the strengthening of regulatory backtesting, the intermediary should be able to document its choices with regard to the following:

- selected percentiles for backtesting and depth of time series;
- frequency of tests (in addition to regulatory ones);
- criteria to split the overall portfolio into subsets in order to carry out the related partial tests;
- statistical tests to analyze the observed deviations;
- type of internal reporting, reporting to corporate bodies, actions to be undertaken as a result of problems possibly found.

As part of the analysis of deviations, the intermediary is expected to carry out periodic tests such as the verification of unconditional coverage and independence (see Annex III/1) [3].

(text omitted)

III.1.7 Internal auditing

(text omitted)

III.1.7.2 Expected firm practices

The internal audit function should check, at least once a year, all the regulatory profiles and, in general, the internal system level of suitability to the requirements set for its recognition.

Within the annual "general" verifications, or through targeted checks, the internal audit is expected to focus controls on the aspects most exposed to problems, as they emerge from the validation process, the reports by the market risks monitoring unit or other indicators arranged to this end (such as operational errors, increase in the numbers of "overrunning" resulting from backtesting, substantial or repeated breaches of operating limits).

The internal audit function should proceed according to a formalized program of activities to be carried out, by planning checks so as to ensure a "control coverage" on the overall market risks management system and on all operational lines and units taking such risks, including any foreign branches.

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[3] The hypothesis checked by the first type of test assumes that the deviations observed by the backtesting correspond exactly to the percentage of coverage as determined by the chosen percentile (in other words, for a VaR measure equal to 1 percent used in a 1,000-day range, the expected number of deviations has be equal to 10). On the contrary, the independence test aims to check if the deviations observed at different dates are independently distributed. This means that a deviation observed in the past does not provide information on present or future deviations. The verification of the independence properties of deviations aims to ensure that the model quickly adapts to the new information influencing the dynamics of prices of assets held.

The audit results are expected to be clearly and timely reported to the senior management and the organizational units responsible for developing and managing the internal system. Moreover, the internal audit function is in charge of overseeing the resolution of anomalies and weaknesses emerged and reported, thus ensuring the function effectiveness.

With regard to quantitative issues (revision of VaR calculation models or of pricing models, verification of accuracy and appropriateness of the volatility and correlation assumptions), the internal audit should also use quantitative checks, by applying procedures and measures based on techniques for determining parameters that are different from the ones used by operational structures or by the market risks monitoring unit. Indeed, it is recommended that the internal audit carry out independent cross-checks – sample checks, or checks focused on highly complex sectors – which, if compared with those carried out by the desks or the market risks control unit, allow to uncover anomalies or inconsistencies in pricing or risk measurement.

(text omitted)

III.2 Quantitative requirements

III.2.1 Criteria for the identification of risk factors

(text omitted)

III.2.1.2 Expected firm practices

The term structure of interest rates represents a key input both for the evaluation of portfolio positions and to bolster the calculation of VaR. In general, in front-office applications, operators use interest rate structures directly obtained from the market as these allow to evaluate the set of instruments in the portfolio through a direct comparison with the prevailing quotes. In risk management, on the contrary, the tendency is to use other, extremely sophisticated techniques to build the yield curves.

In order to ensure the highest possible consistency, interest rates structures used in front-office applications and in the internal system are expected to tally at least in the end-of-day evaluations. Any differences between the two curves, related not only to the different purposes but also to their possibly different production frequencies [4], should turn out to be minimal and be adequately monitored.

In estimating the yield curve, at least six maturity brackets are required in regulation. As a matter of fact, rate structures calibrated on a larger number

[4] The structure of interest rates is indeed constantly used in trading activities; consequently the front-office normally needs it to be estimated during the day.

of nodes (fifteen to thirty) can be found in the best business practices. As to the width of maturity brackets, it should be kept in mind that a constant interval does not necessarily constitute the best representation of risk, given also the different variability of interest rates for the various maturities.

The assessment of the adequacy of the nodes placement along the rate structure should also depend on the intermediary's activity, with a greater concentration of nodes on the maturity brackets where activity is concentrated, in order to minimize evaluation errors associated with the use of interpolated rates, rather than rates observed on the market.

Building the yield curve requires the identification of contributors and the application of interpolation and smoothing techniques. The intermediary is expected, in the selection process, to aim to achieve the best balance between the following guiding criteria: level of adaptation to market data, estimation speed, and robustness of results.

In order to limit the risk factors considered by the internal system, exposures to exchange rates between two currencies other than the euro may be split into two distinct positions, both against the euro. The forward exchange rates may be determined on the basis of covered interest rate parity, which takes into account the differential between the interest rates on the two currencies.

Also in the case of equities, there is not always a risk factor for each stock price. For instance, the prices of a newly-listed share or of one listed on an emerging market may not be available. In this case, the yield of the equity may be estimated through the performance of its stock exchange index [5]. The coefficient linking the share yield to the performance of the stock market index is called "beta". The "market yield" risk factor may thus be common to all equities listed on that market for which the time series of prices are not available. There are several approaches for estimating "beta"; regulations do not impose special requirements. For intermediaries using such approximation, the general provisions on validation (see Paragraph III.1.6) apply to the verification of the assumptions underlying the internal system.

For units of CIUs, whenever the risk factor corresponding to the value of the unit is not available the share yield can be expressed through the benchmark(s). This applies especially to passively-managed CIUs (for example, ETFs). The risk control unit is expected to monitor the validity of the approximation made.

As to positions on commodities, attention should be focused on:

[5] A share yield might be estimated through the yields of two or more stock indexes (e.g. a geographical index and a sectoral one, whenever an index both sectoral and geographical is not available).

- the so-called "convenience yield", that is the possible relative convenience of holding the material assets rather than the forward contract, in case of shortage of supply due to contingent factors, whenever the internal system uses spot prices as risk factors also to estimate forward prices;
- liquidity risks associated with less liquid positions (e.g. forward futures with remote maturities).

Especially for intermediaries active in options (even implicit ones, such as those embedded in convertible bonds or structured instruments), which therefore take volatility risks also on different maturities, it is necessary that the internal system grasps the "vega" factor appropriately. In particular, volatility “surfaces” shall be considered, having implicit volatilities measured by taking two variables into account: the current price compared to the strike price (so-called "moneyness") and the "option maturity" [6].

The intermediary is expected to select the level of granularity descriptive of the volatility surfaces (number and chosen values of “moneyness” and maturity) with a view to the type of activity carried out, possibly by detailing the choices according to the underlying factors.

With regard to the issue of storing (recording) the volatility surfaces, intermediaries sometimes use a frequency different from daily as the availability of data for building volatility surfaces of interest rates and equities does not always allow a fully reliable daily processing, particularly for the extreme values of the surface owing to the limited liquidity of the underlying factors [7].

The calibration of parameters of volatility surfaces inferred from the market is a key activity for intermediaries using stochastic volatility models [8]. In such cases, the calibration parameters take the role of risk factors (for example, the correlation between volatility and the underlying factor, the "volatility of volatility", the speed at which the current volatility tends to go

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6 The first variable defines the so-called "volatility smile", according to which the "out of the money" and the "in the money" options tend to have higher implicit volatilities than "at the money" options. The second variable defines the time structure of volatility, on the basis of which option implicit volatilities differ depending on their time to maturity.

7 In this respect, data on volatility surfaces concerning the exchange rates of major currencies appears to be the most reliable since the markets are liquid for almost all maturities. As regards the volatility surface of interest rates, the lower reliability of data mainly depends from the number of rates making up the yield curve and the limited liquidity of the underlying factors for some points of the curve. As regards equities, the scarcity of reliable data comes from the absence of derivative contracts on some equities infrequently traded on markets.

8 The Black and Scholes model assumes, as known, that volatility is constant. In more complex models, it varies stochastically; to take this into account, option pricing models based on two random variables - the underlying factor and its volatility (see the Hull and White and the Heston models) - have been developed.

back to its long-term value, the value of the long-term volatility) which require the feeding of time series with the highest possible frequency.

The base risks associated with the generic interest rate risk are related to less-than-perfectly-correlated movements between the yield curves of different financial instruments; with reference to commodities, these risks are related to less-than-perfectly-correlated movements between similar but not identical commodities and the exposures to variations in forward prices arising from non-coincident (contractual) maturities. The intermediary is expected to create a monitoring system able to determine a base risk estimate associated with the correlation between changes in the risk factor not explicitly considered and estimated on the basis of one or more other risk factors and their variations.

On risk factors included in the residual class (inflation, dividends, correlation, etc.), often characterized by low observability and liquidity, it is expected that these be identified with the greatest care and that the effect of variations of their magnitude on portfolio value be quantified, even if minimum accuracy levels are not set in regulation, possibly by using techniques alternative to VaR (specific stress tests, worst-case scenarios).

(text omitted)

III.2.2 Criteria for calculating VaR

(text omitted)

III.2.2.2 Expected firm practices

In general, intermediaries are expected to have properly explored – in the perspective of striking the best balance between accuracy of estimates and operational efficiency while taking into account the main features of their operations – the different options available with regard to the standards for the calculation of VaR:

A. the re-assessment of positions technique;

B. model-based approach;

C. depth of time series and weighting techniques;

D. the "time scaling" rule.

A. Re-assessment of positions technique

In order to calculate the changes in value of portfolio positions in the various scenarios relevant to the adopted approach, intermediaries are expected to use, whenever possible, the full re-assessment technique, which provides for the full application of the pricing formula chosen to each relevant scenario. Applying the full re-assessment technique may cause efficiency problems especially in case of model approaches basing their

estimate on a substantial number of scenarios and with particular reference to the positions in financial instruments for which the assessment functions require numerical or simulation techniques [9].

Intermediaries using partial re-assessment techniques, based on an approximated value of portfolio positions through "sensitivities", are expected to assess and monitor the following issues in the validation process:

- calculation methods. Re-assessing the instruments according to pre-determined variations of the relevant underlying (so-called "full sensitivities") on the basis of “variation steps” of the risk factor commensurate to its volatility is considered more prudent for the intermediaries than using analytical evaluation formulae, which are often based on simplified evaluation approaches;
- number and order of the "sensitivities" considered. The partial re-assessment approximates the percentage change in value of individual financial instruments by using the Taylor formula of series expansion which, from an analytical point of view, is equal to the algebraic sum of the sensitivity measures of the financial instrument multiplied by the variation of the underlying risk factors [10]. The approximation usually does not go beyond the analysis of first order sensitivities (delta, vega, rho, tau) and, just for the main underlying factor, of the second (gamma). Second order sensitivities for other factors or for two factors as well as cross-sensitivities (cross-gamma) are rarely considered. Intermediaries are expected to assess the soundness of the chosen approximation depending on their operational characteristics and the strategies pursued by their trading units;
- treatment of contracts having discontinuities in the payoff function (e.g. barrier options). Sensitivities near the discontinuity point tend to assume growing values which, for management purposes, make the VaR calculated through partial re-assessment unreliable and unusable. In such cases the intermediary is expected to have implemented appropriate organizational safeguards (close monitoring of these positions by the market risks monitoring unit and formal policies for their proper and prudential treatment within the sphere of risk measures) so as to avoid that these positions may negatively affect the VaR measurements, and allow at the same time their inclusion in risk management and in the calculation of capital requirements.

[9] Examples are the "path-dependent" or American-type options, assessed by means of Monte Carlo techniques or finite difference approaches.

[10] Only when first order “sensitivities” are used; otherwise, the analytical formula will become more complex.

B. Model-based approach

In a simplified taxonomy, model-based approaches that may be adopted for the calculation of VaR can be ascribed to the following families (see Annex III/2):

- parametric models, which assume an *a priori* knowledge of the probability distributions of the various risk factors (the models “portfolio normal”, "asset normal", "delta-gamma normal" are amongst the most important ones);
- simulation models à la Monte Carlo, in which the possible time paths of several risk factors are generated (also in this case, however, a parametric *ex ante* form for the distribution of returns is assumed; it would therefore be called a "semi-parametric approach");
- historical simulation models, in which the possible paths of the risk factors are generated on the basis of collected historical observations (simple and filtered historical simulation).

In the selection of the model-based approach the intermediary is expected to screen benefits and disadvantages of the various options available and to check the compatibility of the chosen solution with the features of its own exposure to market risks.

If parametric models are adopted, the following specific issues are expected to be properly assessed:

- the solidity of the assumption of normality of the distribution of risk factors (to be evaluated through appropriate tests and comparisons);
- the impact on the VaR measurement arising from the presence in the portfolio of highly non-linear instruments [11];
- the reliability of techniques for estimating the variance/covariance matrix especially in the presence of high levels of granularity in the representation of risk factors. In the estimate of a variance/covariance matrix, the number of risk factors independent of each other cannot be higher than the depth of the time series used to estimate the values of the matrix. Intermediaries should assess the scale of the described effect, also by making a comparison of the VaRs obtained under different time depths;
- the level of approximation determined by the use of linear correlations for the aggregation of risk measures.

[11] Non-linear instruments may determine growing variations of a risk factor not followed by growing variations of the portfolio's value (so-called “non-monotonicity”), with consequent unreliability of the risk measure.

If Monte Carlo simulation models are adopted, the following issues are expected to be properly assessed:

- the selection and verification of the solidity of the chosen parametric form (usually the "normal") of the risk factors' distribution and how to shift from a univariate distribution to a multivariate one;
- the reliability of techniques for the estimation of variance/covariance matrices (see the similar point for the parametric models);
- the search for the best balance between reliability of the estimates and computational efficiency with respect to the choice of the number of simulated scenarios and techniques possibly used to improve the efficiency of the sampling.

In the event of adoption of historical simulation models, the choices concerning the depth of time series and the weighting techniques are expected to be properly evaluated, in order to balance the significance of the measurement and its stability. As the historical simulation VaR is not, in fact, an estimation model but rather a technique, it may show sudden jumps in values due to the entry or exit of observations from the time series. The market risks monitoring unit is expected to be aware of the issue, adopt systems directed at its limitation and take action to ensure that the measurement does not lose functionality and acceptance by traders.

C. Depth of time series and weighting techniques

Intermediaries should carry out the research necessary to assess, also by risk segment, any problems related to the reliability and availability of time series.

Intermediaries are expected to follow prudent and documented practices in relation to the risk factors for which the data necessary to make estimates on the basis of the desired historical depth is not available or reliable, in order to replace or supplement incomplete data series.

D. The "time scaling" rule

Generally, the risk measure used for internal management purposes is calculated on a daily time horizon and subsequently converted, for supervisory purposes, into a ten-day one. Such conversion often takes place by means of the $\sqrt{T}$ "scaling factor". This procedure is statistically appropriate only if the very-short-term return rates for financial assets are identically and independently distributed according to a normal distribution. This, in particular, calls for the negligible presence in the portfolio of non-linear instruments and a sufficiently constant composition of the portfolio.

In this respect, intermediaries are expected to assess the opportunity for corrective or alternative solutions [12] and to be in any case aware of the degree of approximation introduced by the adopted simplification.

(text omitted)

III.2.3 Specific risk

(text omitted)

III.2.3.2 Expected firm practices

The financial instruments whose value or yield depend – to a significant extent – on the credit standing or the stock prices of a diversified basket of economic entities (such as derivatives pegged to broadly diversified indices) are not exposed to specific risk to the same extent as the level of diversification of the reference index or basket.

Intermediaries are expected to adopt criteria and methodologies aimed at determining what characteristics (e.g. an upper limit to concentration) an index should have in order to be considered well-diversified and be excluded from the calculation of specific risk. In particular, a sectoral index, even if geographically diversified, cannot be deemed as widely diversified. In general, in defining criteria intermediaries should not be less prudent than the regulation for the identification of broadly diversified stock indices within the calculation of the position risk on equities in the standardized method [13] and for the application of the simplified look-through method in the calculation of position risk on CIU units in the standardized method [14].

A. Idiosyncratic risk

In carrying out "effectiveness" tests, intermediaries are expected to conduct regressions on time series spanning time frames of at least one year. The risk factors to be tested – different from those already included in the internal system as risk factors – should at least be those related to the most substantial positions in the portfolio.

The "sensitivity to concentration" test is generally passed if, other things being equal, a greater concentration in the portfolio is automatically

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[12] A technique followed by some intermediaries to calculate ten-day variations in an almost direct way starts from the observation of the 260 daily changes recorded in a year, from which 52 weekly changes are drawn. Then, ten-day changes are built by combining the weekly changes, which are considered statistically independent, resulting in 1,326 ten-day changes (equivalent to the combination of 52 elements of rating 2). The ten-day VaRs are then calculated on the basis of these 1,326 scenarios; this determines *inter alia* a significant increase in the number of relevant scenarios, with positive effects on the estimate's soundness.

[13] See Circular 263, Title II, Chapter 4, Part 1, Section II, par. 3.2.

[14] See Circular 263, Title II, Chapter 4, Annex F.

matched by higher values of VaR measurements. However, the intermediary should implement additional safeguards, including organizational ones, in order to avoid excessive risk concentrations. In particular, caps to the portfolio concentration, at least in terms of the group to which the issuer belongs and business sector, should be defined.

With regard to the implementation of scenario-analysis-based stress tests, reference is made to par. III.2.6. It should however be pointed out that expected practices only apply to idiosyncratic risk-sensitive portfolio components.

In order to conduct appropriate "base risk coverage" tests, when the prices of both the hedged and the hedging assets are not included among the internal system risk factors and the intermediary pursues arbitrage strategies, a procedure estimating a proxy of base risk with reasonable frequency has to be set [15] and its results used to increase VaR.

With regard to the "retrospective" test, the intermediary is expected to establish and regularly perform "backtestings" on individual positions. These back-tests should be carried out on a sample basis by selecting the positions in the portfolio according to relevance and complexity.

B. Event risk

Compared to the estimation of the specific risk idiosyncratic component – which typically is a continuous diffusive process – the quantification of the exposure to event risk brings additional complexity with regard to both the model design and the availability of data.

In order to quantify the event risk, intermediaries are expected to use techniques allowing a more precise estimate of the distribution tail than that produced by the traditional VaR estimation methods.

In theory, a VaR model based on historical simulations may be able to jointly grasp the idiosyncratic and event components of the specific risk insofar as the time series used are long enough to adequately capture the discontinuities in risk factors. However, normally a VaR estimated through historical simulations is based on time series which, to properly reflect the latest changes in volatility, do not have sufficient historical depth to also represent the event risk. In practice, by using a one-year estimation period, a sufficiently large number of extreme observations is not likely to be available and, consequently, the distribution tails may not be estimated correctly [16].

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[15] Such proxy might be the expected volatility of the percentage or logarithmic changes of the hedged and hedging positions' combined value.

[16] If, say, the "jump" probability was 0.004, for a historical simulation VaR based on 250 observations only one "jump" in the data set used should on average be recorded. It is clear that such a sample size cannot be considered as adequate to correctly represent the event risk.

Alternatively, a mixed stochastic process may be used, in which the idiosyncratic risk (continuous diffusive process) and the event risk ("jump-type" process) are jointly represented. This makes it possible to attain a density distribution in which the presence of more extreme events pushes a part of the probability mass from the centre to the tails, thus increasing the degree of kurtosis, possibly introducing a degree of asymmetry in the distribution.

Operationally, it is necessary to estimate the two components (diffusive process and "jump") on the basis of datasets with different historical depth. While for the idiosyncratic risk not extremely deep time series are typically used (normally one year, sometimes weighted to increase the relevance of the latest information), when it comes to the event risk it becomes necessary to use significantly longer time series to grasp an adequate number of events which by their nature are rare (for example, a 5-year time series might be usefully considered in estimating the event risk).

The intermediary is expected to have properly assessed the choices made for the estimation of parameters and the calibration of "jumps". In particular, the best balance between the need for simplicity and a real significance of the portfolio has to be struck in selecting the type of data used for estimates (for example, data broken down by individual issuer or rating/sector class) and the correlations between events need to be properly estimated.

Another solution to autonomously model the event risk component might be to use techniques to directly estimate the distribution tail (as, for example, the "extreme value theory"). In addition to monitoring the methodological problems, the intermediary should solve the specific problems inherent in the managerial integration of different risk measures.

In principle, solutions aimed at estimating the event risk component in ways similar to those used to estimate credit risk (credit VaR-type models) do not seem suitable. In these models, indeed, in addition to an increase in the reference time frame for risk estimates – which might make them excessively prudent or poorly "risk sensitive" – the problem of excluding events not directly ascribable to variations in the issuers creditworthiness would arise.

Intermediaries are expected to implement alternative solutions, such as stress testing, for classes of instruments or issuers for which time series capable of correctly describing the event risk in a VaR model with a 10-day time frame and a 99% confidence interval are not available.

C. Default risk

The additional requirement for default risk should be calculated for all positions in the trading book which are directly or indirectly sensitive to default risk.

All equity positions not meeting the liquidity standards required to be covered by the VaR model should be included in the additional requirement for default risk.

Intermediaries using the IRB approach to calculate the additional requirement for default risk are expected to comply with the quantitative requirements set for the validation of the credit risk internal systems.

If, conversely, the intermediary develops an internal procedure:

- the risk measures should be estimated with a 99.9% confidence interval and – due to the default risk distribution shape, characterized by very thick tails – directly calculated as the 99.9 percentile and not as a rescaled lower percentile;
- the risk measures should be based on a "liquidity time horizon" (between 10 days and one year) set by the intermediary according to the type of positions in the portfolio, the market characteristics and the internal policies and procedures on trading book management. In estimating and monitoring the adequacy of "liquidity horizons", intermediaries are expected to comply with prudent criteria such as:
  a) to consider "stressed" market situations in terms of liquidity;
  b) to carry out aggregate estimates for different instruments only if there is concrete evidence of similar levels of liquidity among positions;
  c) to estimate wider liquidity horizons for concentrated positions;
- in calculating the additional requirement, the individual risk measures determined over the liquidity time horizon should be related to a one-year time horizon according to a "constant risk level" approach, i.e. by assuming that the portfolio is reassembled with time frames equal to the liquidity time horizon until the one-year horizon is reached. Alternatively, the intermediary may make the assumption – more prudent but less risk-sensitive – of "constant portfolio" for one year [17];
- the risk measures should be estimated by taking into account offsets between opposite positions, when these perfectly hedge all contractual elements (issuer, time to maturity, definition of credit event, etc.). Otherwise, the intermediary is expected to take into account the relevant differences in the calculation of default risk;
- the risk measures should take into account the non-linear nature of the relationship linking certain types of contracts to default risk;

[17] The "constant risk level" hypothesis allows the use of the liquidity horizon PDs (for example: 1m) rescaled linearly to the one-year time frame (for example: *12) instead of annual PDs (which are normally much higher; for example, for AAA, BBB ratings, by a factor of 5; for BB, B ratings, by 2.5), which are required in the case of "constant portfolio".

- the following minimum requirements should be guaranteed in the estimation of the PDs used:
  a) the market data utilized to calculate PDs should span an entire economic cycle and the definition of default should also cover those cases where a substantial decline in market value has occurred which the intermediary, on the basis of internal criteria based on prudence [18], considers equivalent to default;
  b) the PD on a yearly basis should not be lower than 3 b.p.;
  c) the less-than-one-year PDs should be directly estimated on the chosen liquidity time frame rather than "rescaled". Otherwise, the intermediary is expected to verify that this does not determine a loss of effectiveness and prudence of estimates;
- the estimates of LGDs should be based on estimates of the expected market value after the default;
- the additional requirement should not be affected by the benefit deriving from the correlation between default risk and other components of specific risk or, in general, market risk (it is however accepted that it takes advantage of the diversification effect among the default risks of the various names in the portfolio).

Should the intermediary consider the securitization positions within the scope of the additional requirement for default risk, it is expected to verify – from time to time on the basis of formal internal procedures – the compliance with the requirements of continuous activity on the market and of dynamism and depth of the latter.

(text omitted)

III.2.4 Pricing models used and their validation process

(text omitted)

III.2.4.2 Expected firm practices

For each financial instrument, when calculating VaR it is necessary to use a valuation model enabling the calculation of the corresponding changes in portfolio value in the various scenarios (i.e. in the hypothetical changes for the various risk factors). The recalculation of positions by means of the pricing models is also necessary for management and accounting purposes where there are no reliable market prices ("mark to model" evaluation).

[18] As an example, a decrease in value equivalent to default may be a decrease of more than 40% of the market value or a downgrading of at least 3 rating classes.

Pricing models are also the basis to calculate the sensitivity measures used by the trading units to set appropriate trading or hedging strategies and monitor the exposure to risk over time.

Whatever the valuation model, its adequacy needs to be checked periodically so as to ensure as great alignment as possible between theoretical prices and market prices. Such controls are made through initial validation techniques as well as calibration over time of the model parameters [19].

It is desirable for the intermediary to adopt pricing models adequate to its activities and, should it choose to operate proprietary models different from market standards, to be aware of the advantages offered by these models and to verify over time the adequacy of this choice.

In order to minimize conflicts of interest, responsibility for the development of pricing models should be given to the market risks monitoring unit or to a unit hierarchically independent from the trading departments.

The formal process for the validation of pricing models is expected to be based on an assessment independent from those who developed the model and the "front office". The function responsible for validating the evaluation models can also be placed within the market risks monitoring unit.

The main steps of the pricing models validation process should be documented. In particular, considering the various complexity of instruments and their significance in the trading book, the following elements should be highlighted for each evaluation formula adopted: (i) the underlying theory; (ii) the empirical analysis on the model characteristics; (iii) the main assumptions underlying the model; (iv) the potential weaknesses and the model behavior in hypotheses of extreme parameter deviation; (v) the types of contracts that can be evaluated through the model; (vi) the market data used and its sources.

The validation of pricing models should include:

- checking the model input data, both internal (e.g. by verifying the correspondence between the data provided and the contractual terms that generated the transactions covered by the data) and external (for instance, by comparing different sources);

[19] Calibration may be simple in some cases, as in the Black and Scholes model, which creates a bijection between the price of an option and the implied volatility. In others (such as, for instance, stochastic volatility models or "Libor market models") calibration may be more complex as it is necessary to look for values of the model's parameters allowing the best possible approximation of market prices at a certain time. In these cases, calibration often uses advanced mathematical and numerical methods and has a high level of discretion with regard to the interpolation techniques used, the choice of reference market values for consistency maximization and the timing for procedure implementation.

- checking the theoretical model. To this end, a useful technique is "benchmarking" – i.e. the comparison between the results obtained through the model under consideration and those of similar models previously used by the intermediary – to actual market prices (representing in a sense, at least for simple instruments, the "true model" [20]), and the other models available from the literature and used by other market operators;
- checking the code (software) used to calculate the value of the financial instrument on the basis of inputs and the theoretical model used. Should the code be purchased, while respecting the supplier's privacy, such assessment should however be guaranteed (also through the analysis of the testing process used by the supplier); where the model is developed internally, the assessment can be carried out through a new implementation independent from the first developer of the model (so-called "dual coding");
- checking the model results. The comparison with the results obtained through alternative models (or market prices, where available) can be carried out in a "retrospective" mode and/or through the generation of scenarios ("what-if analysis") in order to test the solidity of the model in "extreme" market conditions that have not yet occurred.

In general, the intermediary is expected to use a single pricing model for the assessments of both the "front office" and the market risks monitoring unit. Should this not be possible – also because of constraints related to applicative infrastructures for trading services and risk monitoring – adequate consistency checks should be ensured to guarantee an acceptable alignment between the values calculated by the various valuation models. Negligible differences are acceptable, provided that their size and trend are constantly monitored by the market risks monitoring unit.

The market risks monitoring unit is expected to make regular and thorough checks of the valuation models, also after their adoption, to ensure consistency with the best market practices. This activity may also be partly delegated to desks, which may provide guidance to the risk control unit on the adequacy of the pricing model in comparison to market prices.

For valuation models requiring complex calibration procedures, characterized by high levels of discretion (as the aforementioned "Libor market models" or the stochastic volatility models), the responsibility for calibration should not be allocated to front-office staff but given to the model-developing unit or the risk control unit. The unit responsible for calibrations should check daily the adequacy of the model parameters to

[20] In this regard, special caution should be used when the intermediary "bets" against the market - i.e. it is convinced that its own theoretical model gives a better price (theoretical, indeed) than that quoted on the market - and therefore implements strategies aimed at profiting from such price differences (arbitrage).

reflect the actual market prices. For example, the calibration unit should check the adherence of the theoretical volatility surfaces to those gathered from the market and should carry out a new calibration whenever the differences found for certain maturities exceed a threshold possibly agreed with the desks.

Procedures related to calibration are expected to be clearly defined and documented, with particular reference to the discretionary decisions made and any difficulties possibly met.

If calibration is assigned to a unit different from risk control, the latter should be fully informed and aware of possible specific problems, implications and discretionary powers in order to check its proper application over time.

(text omitted)

III.2.5 Backtesting

(text omitted)

III.2.5.2 Expected firm practices

A proper analysis of the results of a backtesting based on "actual net P&L" calls for a preliminary assessment of the following aspects:

- criteria for determining the daily P&L, with particular reference to the procedures for reassessing the positions outstanding at the end of the day (for listed and unlisted instruments);
- exclusion from the P&L of the cost/revenue components related to fees, the results of intraday trading, the contribution related to the accrued interests, the reassessment of positions opened during the day and not yet closed.

Both the procedures for the preparation of the P&L and the exceptions should be analyzed by the intermediaries on the overall portfolio. A finer analysis, although not strictly necessary to count exceptions and impose the resulting increase, may provide useful indications on the existence of potential specific problems related to the use of the internal system for specific instruments or markets.

The assessment of the information system's ability to break down the net P&L in its various components is a significant step in the analysis of backtesting results, to identify which factors determined the "deviations" (such as, for example, abnormal volatility values or correlations, ignored risk factors, erroneous calibration of pricing models, incorrect determination of profit). The intermediary is expected to carry out such analysis in order to identify any necessary changes to the internal system.

(text omitted)

III.2.6 Stress tests

(text omitted)

III.2.6.2 Expected firm practices

Intermediaries should develop stress tests according to the scale of their operations, the sophistication of their business and the diversification of their portfolio.

The intermediary is expected to carry out stress tests according to methods based on historical, hypothetical and specific scenarios. The various approaches should be preceded by a survey on their own vulnerabilities and an analytical description of the nature and composition of their portfolios, so that stress tests may be primarily oriented towards them.

A. Historical scenarios

The intermediary is expected to consider past crises, related to high market turbulence (e.g. the stock market collapse of 1987, the fall in bond prices in the first quarter of 1994, the Asian crisis of 1998, the "subprime" market crisis of 2007-2008).

B. Hypothetical scenarios

Scenarios bringing together the most severe changes in the volatility and correlation parameters should be built, taking into account historical data.

Scenarios thus identified should cover a wide range of factors capable of generating extraordinary losses and profits in the trading book. Examples include:

- parallel shifts of the yield curve;
- changes in the slope of the yield curve;
- combinations of the two scenarios mentioned above;
- changes in correlations between different yield curves (for the same currency and between different ones);
- changes in volatility and/or in value of stock market indices;
- changes in volatility and/or in value of major exchange rates;
- for options, changes in value and volatility of the underlyings;
- changes in correlations between the major risk factors.

C. Specific scenarios

The intermediary is expected to develop such scenarios by relying on the experience and knowledge of staff working in the trading and risk control units. With regard to the characteristics of the portfolio to be considered in

the construction of specific scenarios, the following are mentioned as an example: presence of significant directional positions; the importance of option positions with negative gamma and/or vega; the magnitude of spreads among maturities on the yield curve. The problems associated with the illiquidity of markets in crisis situations could be grasped by assuming the impossibility of liquidating the positions over a sufficiently long period of time.

(text omitted)

CHAPTER IV
Counterparty risk

IV.1 Organizational requirements

IV.1.1 Role played by the supervisory, management and control bodies

(text omitted)

IV.1.2.1 Expected firm practices

Please refer to Chapter III of this Section, par. 1.1.2, taking into account that information provided therein should be read with reference to the counterparty risk measurement system.

(text omitted)

IV.1.3 Structure and functioning of line controls

(text omitted)

IV.1.3.2 Expected firm practices

Please refer to Chapter III of this Section, par. 1.2.2, taking into account that information provided therein should be read with reference to the counterparty risk measurement system.

(text omitted)

IV.1.4 Structure, organization and functions of the counterparty risk monitoring unit

(text omitted)

IV.1.4.2 Expected firm practices

The hierarchical and functional independence of the counterparty risk monitoring unit from the trading and lending units is ensured by an appropriate placement within the organizational structure. The layout must clearly emerge from the intermediary's official documents.

Besides organizational safeguards, the actual independence of the monitoring function should also result from an adequate allocation of quantitative and qualitative resources. The adequacy of resources is necessary to allow – also through an identical standing in communications

with the trading and lending units – the effective implementation of the activities the unit is tasked with.

Given its responsibility for the quantification of exposure to counterparty risk, the risk monitoring unit ensures the completeness and relevance of the risk measures produced as well as the monitoring of capital charges.

Maintenance and update of the information systems used to operate the internal system may be attributed to the counterparty risk monitoring unit. This requires additional resources, exclusively dedicated to this.

The counterparty risk monitoring unit ensures that all market data used for calculations are timely and completely updated and stored in a system of controlled archives.

In addition to methodological development of the internal system, the counterparty risk monitoring unit should also be tasked with its maintenance and update and with performance checks (backtesting and stress tests).

The unit should also take part (or, in case of overlapping with the market risk monitoring unit, it should be responsible for) in both the validation of theoretical models for the pricing of instruments exposing the intermediary to counterparty risk and the periodic estimation of the parameters used (e.g. correlations, volatility).

The counterparty risk monitoring unit should be responsible – jointly with the other competent functions – for proposing to the management body the allocation of limits to counterparty risk exposure for the whole intermediary and the different operating units (trading and lending units); a breakdown by counterparty, sector and rating aligned with the methodology, the operational structure and the allocated capital should also be provided.

The counterparty risk monitoring unit should also be responsible for verifying compliance with limits. It reports to the senior management any breaches of the set operational limits and submits, for the subsequent decisions, all current and prospective risks that may deserve specific attention. Breaches of limits should be promptly brought to the attention of managers on the various operational levels, as specified in internal procedures (recipients, mode of transmission, etc.). Breaches of the overall exposure limit should be readily brought to the knowledge of the body in charge of or mandated with ordinary management.

Reports of the counterparty risk monitoring unit should be differentiated as to contents and frequency of submission in relation to the rank of managers receiving them. The reports for operating structures should be produced at least daily and weekly. Daily reports are designed for the day-to-day monitoring of exposure to counterparty risk as well as for the verification of compliance with limits. Weekly reports provide the managers of operational units and the top managers with a comprehensive view of the risk profile and its trend. Weekly reports should at least include:

- the measures of counterparty risk at various levels of aggregation;
- the level of absorption of limits;
- an analysis of the main determinants of the development of counterparty risk.

The weekly reports should be instrumental in discussions between the counterparty risk monitoring unit and the managers of trading and lending units in dedicated meetings.

Less frequently (monthly and/or quarterly) the counterparty risk monitoring unit should produce reports to the bodies responsible for the intermediary's ordinary management (for example, the CEO).

The counterparty risk monitoring unit should provide the Supervision with the information required by regulations on internal systems.

(text omitted)

IV.1.5 Policies and procedures for measuring and monitoring counterparty risk; documentation on the internal system

(text omitted)

IV.1.5.2 Expected firm practices

Procedures should be designed:

- to assess and monitor, on a daily and intra-daily basis, the credit lines and to manage the breaches of operational limits, so as to set up increasing authorization brackets ("escalation") related to the percentage of excess over the limit and the time necessary to return within the limit;
- to identify, monitor and control – from the early stages of a transaction and over its life – the instances of general and specific risk of unfavorable correlation, i.e. the possibility that a counterparty's probability of default and the exposures to it be positively correlated due to the nature of the transaction (see par. IV.2.5);
- to measure and monitor counterparty risk when the exposure has a maturity over one year, in order to cover the entire duration of transactions (not just the one-year time horizon);
- to ensure that the transaction included in a "hedging set" be assisted by a legally recognized netting agreement;
- to guarantee that the collateral used to mitigate the counterparty risk meets the requirements set by the regulation on credit risk mitigation. The internal rules should include a list of instruments eligible to guarantee the counterparty risk, detailing procedures and time necessary to top up collateral;

- to be implemented whenever the counterparty is delinquent on margin calls, by specifying the hierarchical ranks responsible for the procedure and timing of actions to be implemented.

Should the intermediary use a margin lending system, a limit to the exposure value [1] has to be set. Should such value be exceeded, the counterparty is required to provide adequate collateral and a deadline for topping up margins is set.

Under the "New Products" and "Development and Release of New Pricing Models" procedures (see Chapter III of this Section, par. 1.4.2) the assessment of profiles associated with counterparty risk should be envisaged.

Given the effects that they may determine on counterparty risk measurement, particular importance should be attributed to processes that: a) establish and monitor the counterparty's creditworthiness (from the initial stages of a transaction and throughout its life, so as to prevent the possibility of dealing with a counterparty without having first assessed its creditworthiness); b) discipline the entry into new business segments and the launch of trading on complex or innovative financial instruments.

The system of procedures and processes should be: approved by the competent bodies, communicated and made available to all those concerned, and regularly updated by the competent functions.

The internal system documentation is essential, since it allows to identify responsibilities of the various activities and to limit the dangers that may arise from the absence of a set reference framework.

The documentation should cover the aforementioned procedures and processes as well as all processes and activities related to the internal system (as, for example, methodological principles, pricing models, hierarchy of legal documentation, backtesting, stress tests).

All activities concerning the "line" and "second level" controls should also be described and regulated.

(text omitted)

IV.1.6 Use of the internal system for management purposes ("use test")

(text omitted)

IV.1.6.2 Expected firm practices

The internal system measures should be based on the following processes: a) framing the grid of operational limits; b) reporting to the supervisory,

[1] The definition of such threshold should be documented and undergo periodical (at least yearly) reviews.

management and control bodies; c) determining and allocating economic capital.

Operational limits related to counterparty risk – set with reference to the total portfolio, the different business areas and the individual desks – should be based on the internal system estimates, even if not coincident with the EPE measures on the one-year time horizon.

The coincidence of the pricing functions used for assessments by the trading and lending units with those included in the internal system is one indicator of the degree of integration of the internal system in the operational activity. Should this not be possible, the convergence of different assessments has to be guaranteed and monitored over time.

The use of the internal system for management purposes requires the daily calculation of EPE measures. Any lack of a daily calculation of estimates is only acceptable if the portfolio exposed to counterparty risk is highly stable and the market variables the portfolio is sensitive to have not shown significant changes. Intermediaries are also expected to take into account the specific maturity profile of their portfolio exposed to counterparty risk in the selection of the different time horizons for the calculation of the expected exposures contributing to the EPE estimate (see par. IV.2.1.2).

The measures from the internal system should become part of the reporting on risk presented by the control unit to the various recipients.

(text omitted)

IV.1.7 Internal system validation

(text omitted)

IV.1.7.2 Expected firm practices

Please refer to Chapter III of this Section, par. 1.6.2, for the objectives, organizational issues and the procedures needed to carry out the tasks assigned to the internal validation function.

The internal validation activity should include studies and analysis to verify that the assumptions of the internal system do not cause an underestimation of the risk taken, and that the information framework (contractual data, prices) is sound, correct, complete and kept constantly up-to-date.

After the recognition, the three types of tests specified in the regulation must be carried out and their data and results stored.

(text omitted)

IV.1.8 Internal auditing

(text omitted)

IV.1.8.2 Expected firm practices

The internal audit function should check, at least once a year, all the profiles subject to regulatory requirements and, in general, the internal system compliance with the requirements for recognition.

Auditing should assess both the organizational profiles and the quantitative solutions chosen for the counterparty risk management process.

The organizational measures adopted should ensure to the internal audit function a real independence from the trading units and the other control structures. The internal audit function should only be involved indirectly in the design of management processes and controls for counterparty risk, to guarantee the appropriate confrontation between those in charge of development and control.

The internal audit should prepare at least annually, within the context of ordinary reporting to corporate bodies, a final document describing the activities carried out during the year and their outcomes, to show all particular problems and shortcomings detected and proposing corrective actions.

The internal audit is expected to focus controls – in annual general audits or targeted checks – on the aspects potentially most exposed to problems, as they emerge from the internal validation process, the alerts by the counterparty risk monitoring unit or other indicators selected for this purpose (such as operational errors and substantial or repeated breaches of operational limits).

The internal audit function should proceed according to a formalized program of activities to be undertaken, by planning checks so as to ensure a “control coverage" on the overall counterparty risk management system and on all the operational lines and the risk-taking units, including any foreign branches.

The results of the audit should be clearly and timely submitted to the senior management and the organizational units responsible for the internal system. Moreover, the internal audit function is in charge of overseeing that the dysfunctions and weaknesses emerged and reported are actually fixed, thus ensuring the function ‘s effectiveness.

(text omitted)

IV.2 Quantitative requirements

IV.2.1 Criteria for the calculation of EPE

(text omitted)

IV.2.1.2 Expected firm practices

In general, the method for calculating the exposure to counterparty risk consists of an average over time of expected positive and non-decreasing exposures, estimated – according to a model linking the exposure value to the development of the underlying market variables – for various forecast horizons selected within a one-year time horizon.

The calculation should be made separately for each set of activities falling within a legally acknowledged netting agreement. In particular, the calculation can be made counterparty by counterparty only if the netting agreement is valid for all types of transactions entered into with the same counterparty.

The calculation may take into account the reduction effect determined on the exposure by any collateral related to margin agreements entered into with the counterparty, provided that: the variability of collateral over time is properly considered in the internal system; the collateral meets the regulatory requirements for eligibility; for intermediaries using IRB systems to calculate the credit risk capital requirement, the collateral is excluded from the estimation of LGD (see Chapter II of this Section).

In case the internal system is unable to fully express the effects of netting agreements, a simplified approach taking into account all elements characterizing the agreement can be used [2].

The calculation of EPE is based on estimates of expected exposures over several forecast horizons within a one-year time horizon, possibly reduced to the maximum duration of the assets subject to netting, in case all of them have a duration of less than one year.

Estimates for different forecast horizons are made at constant portfolio: the model does not take into account the so-called "roll-over" risk, i.e. the possibility that exposures from short-term OTC derivatives and SFT transactions be renewed upon maturity. Consequently, the regulatory

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[2] When the internal system is unable to take the netting agreements into account, these can be included in the calculation of EPE on the basis of a simplified approach. Under this procedure, the effective EPE for a counterparty with which a "netting agreement" has been signed shall be equal to the lower of the following:

- the relevance threshold, if positive, provided under the guarantee agreement plus an add-on reflecting the potential increase in exposure during the "period of margin risk". Such add-on is the expected increase in the exposure related to the netting set within the period of margin risk, starting with a current exposure of zero. Such period is equal to: i) 5 working days for netting sets consisting of SFT transactions measured at fair value and subject to daily remargining; ii) at least 10 working days for other netting sets. For netting sets which include exposures in SFT transactions and OTC derivatives under netting arrangements between different categories of exposures, the period with minimum applicable margin risk is 10 working days;
- the effective EPE without taking account of the netting agreement.

formula provides – from a prudential perspective – that the expected exposures estimated for different forecast horizons cannot be decreasing.

The provision allows free choice of the forecast horizons for the estimation of exposures expected within the one-year time horizon: it does not identify a minimum number of maturities and allows them not to be evenly spaced as long as the choice is consistent with the type of instruments in the portfolio.

Regulation does not restrict or limit the models to be used for the calculation of expected exposures: analytical/parametric approaches and simulative ones are therefore allowed provided that the possibility of a "non-normal" distribution of expected exposures is properly taken into account.

In general, the intermediary is expected to take into account its operational characteristics in assessing the various options available with regard to the procedures for calculating the exposure to counterparty risk: re-assessment techniques, model approach, depth of time series, selection of forecast horizons for the calculation of expected exposures and methods of temporal "rescaling" of estimates, and modeling of collateral agreements.

A. Technique for the re-assessment of positions

In order to calculate the distribution of exposure values for each chosen forecast horizon, the intermediary is expected to adopt, whenever possible, the full re-assessment technique, or to be aware of the approximation introduced by the partial re-assessment techniques possibly used. For the illustration of expected practices with regard to this specific issue see Chapter III of this Section, par. 2.2.2.

B. Model-based approaches

Model-based approaches that may be adopted for the calculation of exposures expected on the different forecast horizons can be traced back to the same families considered for the calculation of VaR models used for market risks measurement:

- parametric models, which assume an a priori knowledge of the probability distributions for the various risk factors;
- simulation models à la Monte Carlo, which generate the possible paths followed by various risk factors;
- historical simulation models, in which the possible paths followed by the risk factors are generated on the basis of historical observations.

In selecting a model approach, the intermediary is expected to screen pros and cons of the various available options and check the compatibility of the chosen solution with the features of its own exposure to counterparty risk in

a manner similar to that applicable to market risks (see Chapter III of this Section, par. 2.2.2).

C. Depth of time series

In accordance with regulatory requirements, intermediaries are expected to carry out the tests necessary to verify the internal system needs in terms of depth of time series.

With regard to the consideration of an entire economic cycle and the identification of the wide range of economic situations in the observation period, please refer to the indications given in this regard on the credit risk measurement systems (see Chapter II of this Section) and the methods normally used to carry out stress tests.

Intermediaries are expected to update estimates daily, whenever possible. In the case of less frequent updates (still within the mandatory quarterly update), intermediaries should check daily whether the market conditions call for a new calculation of estimates. To this end, the analysis may be driven by factors such as: discontinuities in the market time series; increases in volatility or correlations of market variables that are considered significant.

D. Selection of forecast horizons for the calculation of expected exposures and methods of temporal "rescaling" of estimates

When calculating the EPE, the estimate of exposure distribution for each forecast horizon chosen for the determination of expected exposures is required.

The intermediary is expected to select forecast horizons in a way that best represents the types of contracts included in the portfolio exposed to counterparty risk (for example, more forecast horizons for the short-term segment or horizons which are at least as frequent as the typical reconfiguration periodicity of the most common types of contract).

In calculating the distribution of exposures for each forecast horizon chosen, the "rescaling" modes to convert the estimates (often based on daily or weekly changes in market variables) into the considered forecast horizon are relevant. For the detailed discussion of expected practices with regard to this issue, see Chapter III of this Section, par. 2.2.2.

E. Modeling the guarantee agreements

The models developed by intermediaries may take into account the reduction effect on the expected exposures determined by margin and guarantee agreements.

In such cases the internal system should be adequately supplied with all the information – including that pertaining to contracts – necessary to

estimate the variability of collateral and to take into account the mechanism of margin acquisition.

(text omitted)

IV.2.2 Pricing models used and their validation process

(text omitted)

IV.2.2.2 Expected firm practices

In general, the selection of appropriate models for the evaluation of financial instruments is a fundamental aspect of the internal system.

In the calculation of EPE for each financial instrument, it is indeed necessary to use an evaluation model that allows the calculation of the expected exposures in the selected scenarios and forecast horizons.

The pricing models adopted for the measurement of market risk should not necessarily coincide with those used in EPE models. Market risks measurement systems differ from those for counterparty risk mostly because of the fact that estimates are based on different time horizons: short-term (up to ten days) for VaR estimates and mid-term (up to one year) for EPE ones.

Whatever the model chosen for the evaluation of the various instruments, its adequacy should be checked periodically so as to ensure the greatest possible adherence of theoretical prices to market prices. Such controls imply the use of techniques for the initial validation of the underlying parameters and their calibration over time.

Please refer to Chapter III of this Section, par. 2.4.2 for the adequacy of pricing models in relation to the operations performed, the structure and tasks of the evaluation functions and the reliability of the development, validation and calibration of the evaluation models.

Finally, intermediaries are expected to use the most adequate evaluation functions or adopt appropriate corrective measures for the estimation of exposures whenever the evaluation functions used for market risks measurements do not adequately take into account the non-linearity of option-type contracts.

(text omitted)

IV.2.3 Backtesting

(text omitted)

IV.2.3.2 Expected firm practices

Backtesting is an important part of the research on the internal system ability to measure risk accurately. It is therefore desirable that

intermediaries adhere to sound practices for the organization of such activities and the integration of backtesting results in both the development and review of the internal system and management reporting.

The backtesting of the robustness of internal systems for computing EPE poses difficulties related to:

a) the numerousness of counterparties. A real and complete "backtesting" should be carried out counterparty by counterparty, or rather for each netting set; this has obvious operational repercussions and, accordingly, the regulations require the backtesting to be carried out by using representative portfolios of counterparties and portfolios selected in such a way that the types of transactions and risk factors to which the intermediary is mainly exposed are adequately represented;

b) the variety of forecast horizons. A real and complete backtesting should be carried out for all forecast horizons chosen for the estimation of expected exposures: from short-term to one-year.

With reference to point a), the intermediary is expected to identify – among the real portfolios by netting set or counterparty – the most significant ones as to the overall exposure, the presence of complex contractual structures, and the type of underlyings. Selected portfolios are also expected to represent a substantial share (at least 50%) of the intermediary's overall exposure, and the high-PD counterparties (typically, non-financial entities) are expected to be properly taken into account, also with regard to possible implications on other risk profiles.

With regard to point b), it is desirable that a large number of time horizons be taken into account so as to increase the statistical power of tests.

Regulations do not provide binding guidance regarding the frequency of backtests. Such frequency is expected to be determined by taking into account the size and complexity of the portfolio exposed to the counterparty risk.

In principle, it is appropriate that such activity be carried out at least at the same time as accounting statements and prudential returns are produced. Intermediaries should act more frequently, usually once a month, whenever they have a sizeable and highly-complex portfolio. The frequency of tests should also be adjusted, when possible, according to the categories of counterparties, particularly in cases where intermediaries sell derivatives to non-financial customers.

Substantial changes to pricing models may impact the significance of time series of exposures used for backtesting. Intermediaries are expected to take this into account and to seek to preserve the significance of backtests.

Since retrospective backtests shall be performed by comparing realized exposures with those estimated by the internal system implying, for each chosen forecast horizon, the comparison between the expected value of a

distribution of exposures estimated ex ante and the exposure realized value, intermediaries are expected to be equipped with statistical inference tests suitable to verify the reliability of the estimated distributions.

(text omitted)

IV.2.4 Stress tests

(text omitted)

IV.2.4.2 Expected firm practices

Counterparty risk arises from the combined effect of two separate risk components: the first concerns the changes in value of the intermediary's credit position determined by fluctuations of market factors (equities, indices, interest rates and exchange rates); the second is linked to the creditworthiness of the debtor. Consequently, the set of stress tests that intermediaries are asked to establish aims to verify the internal system solidity in negative scenarios related to market risks as well as the combination of the two risk components. The impact on the counterparty risk exposure of the sole credit component is indeed subject to the stress tests provided for the recognition of credit risk internal systems.

Information about the stress tests of the counterparty risk "market" component can be found in Chapter III of this Section, par. 2.6.2, keeping in mind that the EPE measure does not take account of the possibility that extreme scenarios in exposure changes might occur due to developments in market variables [3].

Furthermore, the scenarios designed by the intermediary should:

- put the levels of correlation between market variables and credit risk factors "under stress", without ruling out the (even extreme) possibility that the correlations between the counterparties probabilities of default and market factors may change compared to a normal course of business [4];
- also take into account the degree of concentration of the portfolio exposed to counterparty risk. The goal is to build extreme scenarios to measure the potential impact on the exposure to counterparty risk of the gradual disappearance of the benefits of diversification because of the increasing portfolio concentration on individual counterparties, groups of counterparties or economic sectors;
- consider the effect of large transactions on the exposure to counterparty risk. In case of low market liquidity (for example, in the markets for

[3] EPE is a mean over time of average (though rising) exposures, not of peak ones.

[4] On this point see the following paragraph, concerning the general risk of unfavorable correlation.

equity or debt instruments of individual issuers or specific sectors), the occurrence of large purchase or sale transactions can have significant effects on the value of exposures.

In connection to the above, intermediaries are expected to regularly carry out the following types of stress testing:

- tests based on historical, hypothetical and specific scenarios for the component related to market risks;
- scenarios based on stress assumptions about correlations between counterparties default probabilities and market factors influencing the value of exposures;
- increasing portfolio concentration on individual counterparties, groups of connected counterparties or economic sectors;
- tests based on scenarios of low market liquidity, in which the effect of large transactions on the exposures value is simulated.

In any case, scenario analysis should be preceded by an exploration of the major vulnerabilities and by an analytical description of the portfolio nature and composition, so that stress testing can be effective and targeted.

(text omitted)

IV.2.5 Unfavorable correlation risk

(text omitted)

IV.2.5.2 Expected firm practices

Intermediaries are expected to be aware of unfavorable correlation risks and deploy appropriate quantitative techniques to estimate their size as well as the organizational safeguards suitable to limit exposures. The adequacy of techniques and safeguards should be strictly proportionate to the size of derivatives activity, the operational complexity and the degree of portfolio diversification.

Specific methodologies and procedures aimed at identifying and controlling the general risk of unfavorable correlation are expected to be active and formalized as part of the overall treatment of correlation between market and credit risks: the identification could be carried out by envisaging targeted stress scenarios; the control could be sought through the adoption of limits to the activities more sensitive to this risk.

With reference to the specific risk of unfavorable correlation, intermediaries are expected to monitor – at least for the counterparties with the largest derivatives activity – the exposures positively correlated with the default probability of counterparties; where appropriate, transactions with positive correlation equal to 1 shall be prohibited.

(text omitted)

IV.4 Parameters used for calculating exposures

IV.4.1 Alpha coefficient

(text omitted)

IV.4.1.2 Expected firm practices

The state-of-the-art in banking does not currently allow to identify shared behavioral guidelines.

(text omitted)

IV.4.2 Actual maturity

(text omitted)

IV.4.2.2 Expected firm practices

The state-of-the-art in banking does not currently allow to identify shared behavioral guidelines.

(text omitted)

CHAPTER V
Operational risk

V.1 Organizational requirements

V.1.1 Role played by the supervisory, management and control bodies

(text omitted)

V.1.1.2 Expected firm practices

Information provided in par. II.1.1.2 should be interpreted with reference to the operational risk measurement system.

(text omitted)

V.1.2 Structure, organisation and tasks of the operational risk monitoring function

(text omitted)

V.1.2.2 Expected firm practices

As mentioned above, regulations give wide autonomy to intermediaries in terms of organizational choices. The solutions that may actually be implemented depend on the characteristics, size and operational complexity of the intermediary.

In general, the person in charge of operational risk monitoring is the interface of the operational risk management process and is responsible for governing and checking the proper functioning of the overall system of management and measurement of operational risk. This role implies the direct responsibility for any dedicated organizational structure and, as a rule, the functional control of the units/staff involved.

In addition to the calculation of the capital requirement, the specific duties relating to the function include:

- the identification of reference risk classes for the recording and classification of potentially harmful events;
- dealing with the collection and storage processes of the internal system four components, especially the certification of internal loss data and scenario analysis provided by the various corporate units involved;
- monitoring the exposure to operational risk, overall and by risk classes;

- the implementation of the system for periodic reporting to corporate bodies and functions and/or structures concerned, with a description of the specific problems eventually found;
- the proposal for organizational and procedural changes to monitor operational risks and verify their effectiveness;
- the consultancy on operational risks posed by new products/ processes/systems;
- training in the field of operational risk.

Given the pervasiveness of operational risk in business processes, some steps and/or activities of such risk's management system are often conferred upon corporate functions other than those in charge of controls; if so, it is usually envisaged that:

- the operational risk monitoring function has a high authority in the organization as well as an adequate knowledge of the business and support processes and the types of operational risk that these imply;
- a proper cooperation exists between the operational risk monitoring function and the other functions (organization, legal, human resources, accounting, lending, finance, etc.) involved in the management of risks.

(text omitted)

V.1.3 System for the management of operational risk

(text omitted)

V.1.3.2 Expected firm practices

The management system is expected to be clearly and explicitly formalized, i.e. internal regulations defining the major features of the system and motivating the solutions adopted should exist.

(text omitted)

V.1.4 System for the collection and storage of data: general aspects

(text omitted)

V.1.4.2 Expected firm practices

The design and documentation of the process for the collection of data on the four components is one of the most significant and sensitive aspects for an intermediary willing to use its internal system for prudential purposes.

The main objectives of the system for the collection and storage of data should be the following:

- to identify the operational loss events;

- to classify the loss events according to standardized criteria;
- to store and classify the individual losses in ways that make it possible to reconstruct the event's cause and historical development, from its occurrence to the identification of individual accounting records of loss and recovery.

(text omitted)

V.1.5 Reporting system

(text omitted)

V.1.5.2 Expected firm practices

Intermediaries are expected to have a reporting system designed for sharing and increasing the operational risk awareness and for improving management procedures and processes.

One of the main tasks of the operational risk monitoring function should be the organization of an integrated system of information flows on operational risk, also taking account of any information flows already existing at the various corporate units for purposes connected to the use of AMA methodologies, although not directly stemming from them (for example, the internal audit *tableau de bord*, the IT "incident reporting", the indicators of fraud and theft).

The reports to corporate bodies and internal control functions (operational risk monitoring function, internal audit, compliance) should provide an adequate illustration of the following: largest losses and related recoveries; scenario analysis; evolution of aspects of the operational environment and the internal control system able to significantly change the operational risk profile.

(text omitted)

V.1.6 Management use of the internal system ("use test")

(text omitted)

V.1.6.2 Expected firm practices

The ways the internal system is used in management cannot be easily standardized; it should be designed taking into account a number of factors including the size of the intermediary, its operational complexity and, more generally, the level of development reached by the system as a whole.

Given the intrinsic features of operational risk, a direct link between measurement of regulatory capital and risk management cannot be easily traced. Indeed, unlike what happens for market risks, the operational riskiness of an intermediary does not change quickly because it is affected

by several organizational factors (characteristics of processes, quality of resources, internal control systems), which change slowly.

(text omitted)

V.1.7 Internal system validation

(text omitted)

V.1.7.2 Expected firm practices

The scope of validation encompasses the management and measurement of operational risk as well as the verification of data quality and the level of technological infrastructure of the internal system.

The checks on the reliability of quality controls on elementary data are particularly relevant among those to be performed by the validation function; they have to be carried out continuously (automatically or manually) in the operational risk governance and management processes preceding the "operational process", in order to detect any errors before they spread to the logical components of the internal system.

Other checks mainly focus on the consistency and reliability of the internal system and on the effectiveness of management processes and instruments.

The responsibility for the validation process must be clearly assigned, even if the involvement of units in charge of the management of operational risk as well as specialized corporate functions (for example, IT, human resources, organization) might be of help to carry out specific controls.

(text omitted)

V.1.8 Internal auditing

(text omitted)

V.1.8.2 Expected firm practices

The internal audit process should encompass the management and measurement systems as a whole, to comprehensively assess the adequacy – in terms of effectiveness and efficiency – of first- and second-level controls in managing and measuring operational risks.

Auditing should cover the following elements:

- existence of an appropriate organizational model for the management and measurement of operational risk, properly regulated by specific internal rules which include formalized delegated powers and discretionary margins;

- existence of a high-security information system capable of ensuring adequate feeding and integrity of the databases and datasets for calculating the capital requirement;
- adequacy and reliability of data collection and storage systems;
- existence of a reporting system which supplies timely information on operational risk to corporate bodies and managers of the interested functions;
- verification of the suitability and completeness of the activities carried out by the validation function and of the consistency and robustness of the results achieved;
- verification of the "use test".

(text omitted)

V.2 Quantitative requirements

V.2.1 Operational risk measurement system: internal data

(text omitted)

V.2.1.2 Expected firm practices

The intermediary should: (i) identify the information necessary to analyze the operational event, (ii) define the general criteria for recording and classifying historical loss events, (iii) identify the sources – accounting or other – feeding the operational losses database.

The main elements of the information set for the analysis of the operational loss events are as follows:

- gross amount of the loss;
- date of the event: date of occurrence of the loss event;
- date of observation: date of event recognition by the intermediary;
- date of accounting: date of recording of the loss and/or provision in the accounts;
- possible recovery on the gross loss (insurance and other types of recovery);
- internal units that have generated and recorded the loss [1];

[1] In some cases, various units contribute to the process under discussion: the one generating the loss (e.g. the IT unit), the one enduring the loss (e.g. the business line) and the one recording the loss (e.g. the accounting unit).

- typology of the loss event and regulatory business line in which the event has occurred;
- description of the loss event.

Operational losses are usually selected according to the event date, the observation date and the accounting date.

The observation date is the most robust driver for identifying the calculation dataset due to its optimal characteristics in terms of feeding completeness and limitation of statistical distortions. The use of joint criteria to exclude losses which no longer reflect the intermediary's riskiness is also found (e.g. inclusion of loss data with accounting date falling in the last 5 years and date of the event falling in the last 10 years) [2].

To identify the sources feeding the internal losses datasets, intermediaries generally use two approaches: "event-driven" and "account-driven".

In the "event-driven" approach – of a "bottom-up" type – the functions generating the operational losses or responsible for the harmful events are directly involved in the data collection process; in the second type of approach – "account-driven" – the data is taken directly from the accounting archives and then manually "enriched", if possible, in the event description. The chosen solution is often a mix of both approaches, using the accounting analysis to identify the functions reporting operational losses and then directly collecting information from those functions bypassing the accounting. Depending on the approach adopted, the data base is fed manually, automatically or semi-automatically.

In case of non-automatic feeding, once the loss information is recorded, the data collection process should include the so-called "data validation" as an additional level of control; both a line control by the signaling function and a second-level control by the function responsible for operational risk control can be identified here.

The most relevant type of control – among the many available – to check the corporate standard for data quality is cross-checking losses recorded in accounts with loss data entered into operational risk databases [3].

Other useful activities for improving the quality of data are the following:

- to use "decisional trees" for assigning losses to the different types of event and business lines;

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[2] Using the event date determines the systematic exclusion of all losses observed/accounted in the observation period but occurred before this began. Besides, the accounting date, although more objective, tends to generate data clusters at specific times (at year-end, when the losses go to the P&L), with undesirable consequences on the estimation of impact and - especially - frequency distributions.

[3] To facilitate the reconciliation process, it may be useful to explicitly link each event included in the operational losses database with the records stored in the archives of the corporate procedures that originated the loss.

- to calculate and monitor the average time between the occurrence of the loss events and their recording in the firm's database, as well as between this last event and the data validation.

Completeness and integrity of information are supported by both a highly automated data collection process and systems rewarding or sanctioning the reporting or – respectively – omitting the loss data.

The calculation dataset should be built so as to avoid the exclusion of significant or repeated operational losses which are instead included in the operational data base.

(text omitted)

V.2.2 Operational risk measurement system: external data

(text omitted)

V.2.2.2 Expected firm practices

As operational loss data from external sources is collected by intermediaries with different operational and dimensional characteristics, the data collected should be processed with statistical homogenization techniques using internal data (so-called "scaling") [4].

External data sets most commonly used are DIPO, ORX and Fitch. The first two are consortia initiatives in the financial field, on a domestic and international level respectively. The third one is a dataset of operational losses covering many business sectors, of which only data concerning the financial sector is relevant.

Regardless of the consortium type, the intermediaries should use all data from external sources; exclusions are only acceptable if supported by objective and well grounded reasons [5].

Intermediaries should also use external data for operational purposes, e.g. to carry out benchmarking analysis of their organizational and business systems, to assess in advance new possible business segments, to improve quality and credibility of scenario analysis.

(text omitted)

V.2.3 Operational risk measurement system: scenario analysis

(text omitted)

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[4] No dominant "scaling" technique exists in the industry. Among those used there are simple comparison functions of dimensional variables (e.g. gross income, total assets) or techniques based on Bayesian models and/or on the credibility theory.

[5] As an example, in case the Fitch consortium data is used, the exclusion of all operational losses not pertaining the banking and financial sectors is acceptable.

V.2.3.2 Expected firm practices

Intermediaries are expected to develop scenario analysis mainly to capture the risk not adequately reflected in historical losses data. Especially relevant is the ability to detect potential risk factors with low frequency and high impact, considering risk elements or events additional to those tested by the intermediary and reflected in the time series.

Scenario analysis may also serve the more general purpose of integrating historical loss data with subjective and prospective assessments of the whole operational riskiness made by internal ("self-evaluation") or external entities. The assessments may concern either frequency or impact of operational risk events and be accompanied by operational indications, such as measures to be taken to prevent or mitigate the exposure to risk. The scenario analysis may also concern the economic impact of specific facts, extreme but not associated with a probabilistic measure.

An intrinsic characteristic of the scenario methodology is its discretion in determining the risk exposure (as opposed to the greater objectivity of historical data); as such discretion cannot be removed, it needs to be properly controlled and managed. In this perspective, the transparency of this process is essential in all its steps (the so-called "traceability" of the process and results).

Examples of technical measures useful to reduce the potential distortion of judgments (underestimation of risks) are as follows:

- a constant comparison with the risk expressed by historical data, to prevent the "over-optimism" of subjective assessments that systematically reduce the exposure to risks which have already materialized;
- the motivation of assessments, especially where experts certificate a low or nil risk exposure;
- a "quality" analysis of data that constantly ensures reliability of results, avoiding situations of data deterioration;
- the attribution of responsibility (also operational) to the staff producing the risk estimates, through a subsequent cross-check with actual loss events.

Scenario analysis results should be integrated in the operational system, especially in the design of measures for operational risk prevention and containment; they may also be used as drivers of capital allocation.

(text omitted)

V.2.4 Operational risk measurement system: factors concerning the operational context and the internal control system

(text omitted)

V.2.4.2 Expected firm practices

Intermediaries are expected to use the context factors to increase completeness, reliability and currentness of operational risk exposure estimates. To this end, context factors shall always be taken into account, regardless of whether they indicate an improvement or a worsening of the risk profile. The context factors to be included in the internal system should mainly concern changes already occurred in the firm's organization and/or context and, as such, objectively observable.

The context factors – provided that they are coherent with the set purposes and adequately certified – encounter no limits in terms of kind or source limitations and can be (i) internal or external; (ii) of exposure, mitigation or deterioration; (iii) qualitative or quantitative. The pivotal role however should be attributed to internal indicators of activity, known in the literature as "Key Risk Indicators" (KRI), which are in fact financial, economic or capital variables [6]. Such factors should express the level of risk exposure or the state of the pertinent causal factors (processes, systems, resources). Moreover, the assessments by the internal control functions about the existing operational safeguards should have autonomous evidence.

Monitoring the context factors may be useful not only for calculating the capital requirements but also for operational purposes; indeed, it fosters the production and use of corporate data and information indicative of context factors which can be used to mitigate risks.

The integration in corporate practices of scenario analysis and context factors within a single assessment process cannot be ruled out. However, the compliance of both components with the regulatory requirements and the overall coherence of the methodology adopted holds valid, given the objective of giving an exact, up-to-date and non-distorted representation of the firm's risk.

(text omitted)

V.2.5 Granularity of the model

(text omitted)

V.2.5.2 Expected firm practices

Each category should be made up of a total amount of loss-related data under the profiles of cause, type and effect.

Very often, the regulatory breakdown by business line and event type is the "driver" for the definition of the risk classes used to calculate the capital

[6] For example, indicators of management anomalies, such as those on complaints, errors, fraud, "incident reports".

requirement. However, sometimes the granularity determined by such regulatory matrix does not allow for reliable estimates due to the scarcity of data in each class. Accordingly, intermediaries often adopt a less granular classification or use other aggregations straddling the categories.

Although a universal solution does not exist, a minimal granularity (6 to 10 classes) is acceptable when the model is rolled out. As the quantity of data increases, the trade-off between the number of classes and the availability of information for each class should be settled in favor of the former: indeed, it may be necessary to split classes into sub-classes to capture particular operational losses recurring in corporate activities.

(text omitted)

V.2.6 The calculation model

(text omitted)

V.2.6.2 Expected firm practices

A. General aspects

Experience so far shows that intermediaries tend to propose methodological solutions which do not assume causal relationships between operational losses and generating “assets”, which in turn can be summarized in indicators of exposure to operational risk. Such a choice does not result from any regulatory constraint; on the contrary, it comes from a combination of theoretical shortcomings and problems related to the availability and synchronicity of data.

The standard almost unanimously investigated by the industry so far is borrowed from the "theory of risk" and the "actuarial approach to non-life insurance" [7].

The insurance methodology applied to operational risk is called either "Loss Distribution Approach" (LDA), based on historical data, or "Scenario Based Approach" (SBA), when data is simulated. In general terms, the approach assumes that the individual operational losses – actual or simulated – occur within each risk class and year-by-year in a random number and with independent and similar impacts; it also assumes independence between number and impact of operational losses.

The statistical problem substantiates in a separate estimate of frequency distributions (primary) and impact distributions (secondary) and in their combination in an aggregated loss distribution. The risk volume is defined by the regulatory confidence level of the aggregate loss distribution.

[7] It equates capital absorption with a pure insurance premium determined according to the probability to incur unendurable losses (technically called "probability of ruin").

Within the aggregation process of the four components, 'quantitative component' stands for the set of formal instruments aimed at handling the historical data and the models adopted for the scenarios. The consistent consolidation of the results so obtained is called "quali-quantitative integration".

Within the outlined framework, the indicators of context factors usually serve as regressors in building the adjustment parameters (in practice, they are bonus-malus coefficients) which can reduce or increase the requirement resulting from the output of quali-quantitative integration [8].

It is expected that:

- the methodological choices optimally meet the present and future specific operational profile, stemming from a logical process where both the strengths and weaknesses of the adopted methodologies and the reasons leading to the underlying choices have been consciously assessed;
- the treatment of historical and simulated data to homogenize the archives is properly documented and justified from a theoretical standpoint;
- the use of purely subjective assessments is as limited as possible, considering also that, whenever suitable internal time series are lacking, external data are a useful information source.

B. The quantitative component

The traditional LDA model specifies two distributions, respectively for the frequency of loss events (N) and the impact of each of them (X_i). Events X_i are supposed to be mutually independent and also independent from N.

The specification is done by risk class and the respective requirement (class 'Operational CaR' or "OpCaR" [9]) is the percentile at the 99.9% (VaR) level of the distribution ("aggregate distribution") associated with the stochastic sum:

$$S = \sum_{i=1}^{N} X_i$$

[8] Alternative structures are obviously possible, e.g. where external data feeds the model only as an aid to scenarios build up; scenario analysis are exclusively used to correct or validate the requirement originating from the quantitative component; the indicators of context factors are used to allocate the requirement but they do not play any direct or indirect role in the measurement.

[9] For simplicity of exposition, the term "OpCaR" is the generic function to determine capital (by class or overall) at the regulatory level of confidence. It goes without saying that, in practice, such function is expressed in the appropriate risk measure chosen by the intermediary (e.g. VaR, expected shortfall-ES; median shortfall-MS).

Any aggregation of class 'OpCaR' ('$OpCaR_{LDA}$') stemming from the quantitative component is done through a sum, unless incorporation of correlations between classes is taken into account.

If the identification phase leads to adopt a parametric model, the model specification conceptually consists of two stages: i) the identification of functional forms; ii) the estimation of the parameters involved. Whenever an empirical methodology is adopted, only the identification phase is performed.

With regard to the distribution of frequencies, identification is typically limited to the analysis of a very narrow range (Poisson's distributions, negative binomial, and – less frequently – binomial), with components having finite moments of any order [10].

Once the identification phase is concluded, the estimation of parameters (essentially reduced to their expected value) does not pose any significant problems, neither theoretically nor practically, as it can be performed through the usual estimation techniques: simple method of moments (MM), probability-weighted method of moments (PWM), maximum likelihood estimation (MLE), least squares estimation (LS), etc. provided by ordinary statistics.

The distribution of impacts poses greater problems, which can be grouped – with some simplification – in five points:

- the identification and treatment of anomalous data;
- the identification of the functional form;
- the presence of relevance and collection thresholds for observations;
- the estimation of the identified model's parameters and the assessment of estimates' robustness;
- adaptation tests.

The category of abnormal data raises more substantial problems, as it may induce to look for solutions that reduce the number and/or the magnitude of extreme data, with the consequent artificial compression of "OpCaR".

[10] The criterion for judgment is, in the simplest case, linked to the relationship observed between average and sample variance: if the variance is significantly higher than average, the option is the negative binomial distribution, whereas in other instances the Poisson's distribution, identified by the parameter λ (representing both the average and the variance), is preferred. The choice of Poisson is connected with both its "infinite divisibility" property and the fact that the dependence of the aggregate distribution quantile on the moments of order greater than the first is negligible. According to the "infinite divisibility" property, if two classes of risk are "modeled" by two Poisson with parameters equal, respectively, to λm and λn, the super-class obtained from the aggregation of both classes is "modeled" by a Poisson with a parameter equal to $\lambda m+n$.

Although the cancellation of "abnormal" data from the calculation dataset (and therefore its exclusion from the calculation of the capital requirement) may be exceptionally allowed on a case-by-case basis (see par. V.2.1), as a general rule a solution acting on the estimation model (rather than shrinking the calculation dataset) is preferable; in this way, the impact of abnormal data on regulatory capital is mitigated but not eliminated (for example, using particular techniques for parameters estimation, see below).

The possible functional forms which may be reasonably proposed for modeling the impacts are highly differentiated. Generally speaking, standard instruments for the exploratory analysis of observations are normally used ("Exploratory Data Analysis" – EDA) [11].

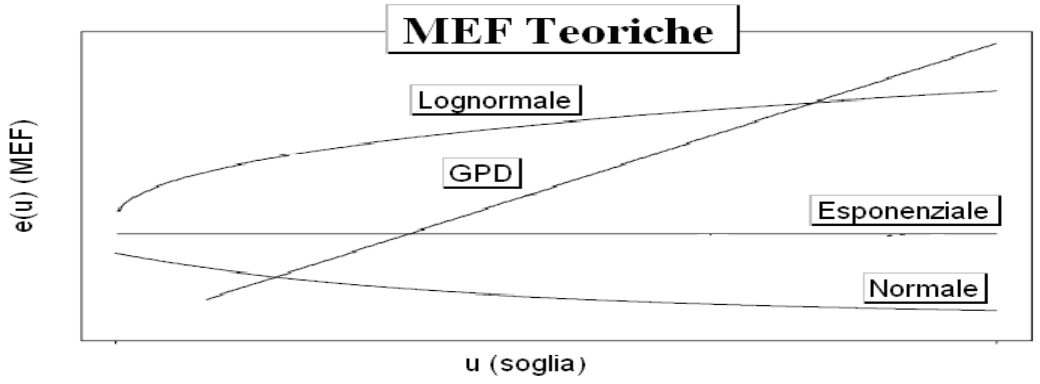
Although it is theoretically possible to use a single distribution for the entire dataset of each class (whenever this happens, the log-normal distribution is the common choice), the solution supported by scholars and most followed in professional practice consists in assessing two different models separately: one for medium/low-size impacts and one for large ones. The two classes are discriminated by a threshold (relevance threshold) beyond which losses are classified as high.

Medium/low sized losses are represented within a set of distributions (log-normal, gamma, Weibull, empirical) generally identified in the range of actuarial practices; distributions with particularly thick tails are used (for example, Pareto, log-gamma, Burr) for high losses. Alternatively – and

[11] It should be kept in mind that, among others, the so-called "Mean Excess Plot" (ME-plot) method, which consists in studying the "Mean Excess Function" (MEF):

$$e(x) = E[X - u \mid X > u] \approx \frac{\sum_{i=1}^{n} (x_i - u)^+}{\sum_{i=1}^{n} \Theta(x_i - u)},$$

where $(x-u)^+ = \max\{x-u,0\}$, $\Theta(x-u) = 1_{[u,+\infty)}(x)$ and $\{x_1, x_2, \ldots, x_n\}$ is the sample of operational losses observed. The MEF follows a typical pattern in specific theoretical distributions, which can be used for comparison.



more commonly – the "Extreme Value Theory" – EVT is used: holding an assumption generally considered valid [12], the losses trespassing the relevance threshold are spread approximately in a known form [13].

The synthesis of the two models is done by building a hybrid form in which, in brief, the distribution referring to the medium-low sized losses ("distribution of the body") is subject to a correction in the branch concerning the loss values exceeding the relevance threshold, using for this specific purpose conditioned distributions ("tail distribution") [14].

If there is a minimal threshold for the magnitude of collected data (collection threshold) – for example because it is clearly uneconomic to detect losses below a given level – the process of parameters estimation

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[12] It is the so-called "condition for the stability of the maximum", for which the maximum sample, suitably normalized, converges in distribution to a not-degenerated limit. If the X random variable is stable compared to the maximum, the result will be (theorem of Gnedenko-Pickhands-Balkeema-de Haan):

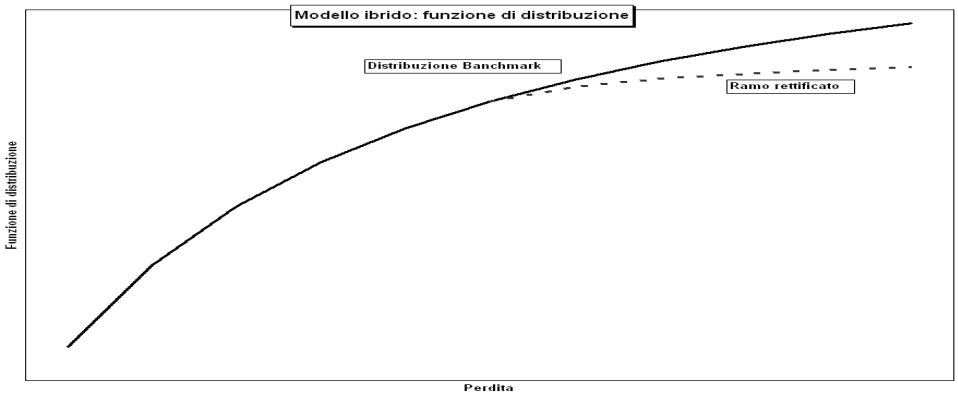
$$\lim_{u\to+\infty} \text{Prob}\{X-u\le x \mid X>u\} = \left\{1-\left[1+\frac{\xi}{\beta}(x-u)\right]^{-1/\xi}\right\}\cdot\Theta(x-u) = G(x-u), \quad (\xi,\ \beta>0)$$

[13] This model realizes the rule allowing the intermediaries to estimate an initial measure at a level no lower than 90%, and from that obtain a 99.9% capital requirement through an appropriate extrapolation technique, whenever the requirement estimated at 99.9% is affected by significant distortion and volatility. Indeed, in case of models with extreme probabilities modeled by GPDs (Generalized Pareto Distributions, or second-level Pareto) the so-called "stability property for translation" applies. According to this, a GPD is always obtained by influencing a GPD to exceed any threshold. The application of this property may allow the analytical calculation of parameters and percentiles at the regulatory level beginning with estimates of these quantities made at reasonably low thresholds (therefore, under conditions of greater sample frequency and stability of estimates).

[14] If F is the distribution of the "body", u is the relevance threshold and G is the “tail” distribution, the hybrid model is the following:

$$\Phi(x) = \begin{cases} F(x) & x\le u \\ F(u)+[1-F(u)]G(x-u) & x>u \end{cases},$$

with the hybrid form, the probability of events concentrating in the tail regions is substantially pushed upward:



(and therefore of risk measures) should take this into account, also with concern to the implications on the frequency distribution [15].

Regarding the estimation of parameters, in addition to the usual techniques already recalled for the frequency, there are also specific methodologies for particular kinds of distributions (for example, Hill and Pickhands estimators for GPD).

In this context, special attention should be paid to the methodologies and results of the estimation of parameters to which the information related to the probability of higher-amount events is associated ('kurtosis' parameter).

The estimate of the kurtosis parameter is made problematic by the fact that the largest data – from which a bigger informative content is expected – are normally very few and therefore the underlying sample variability increases the dispersion of results [16].

However, the inferential toolkit provides solutions to achieve a satisfactory stability of results without losing information on the variability of the phenomenon represented by the most extreme data. In general, stabilization of results may be explicit or implicit:

- explicit if the result of the estimate is subject to constraints which *a priori* compress its variability (e.g. binding least squares or maximum likelihood);
- implicit if the known properties of "tendentiousness" of the estimators used are exploited (e.g. robust estimators such as the “M-estimators”, which are a generalization of the maximum likelihood estimators). It is also known that the PWM estimator tends to provide more stable estimates than the MLE estimator for non-numerous samples.

In general, the intermediary is expected to use the estimation strategies most appropriate for the morphology of each risk class calculation data set,

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[15] If the collection threshold is ω, estimation should refer to the conditioned distribution function $\frac{\Phi(x)-\Phi(\omega)}{1-\Phi(\omega)}$, where $1-\phi(\omega)$ represents the probability of events with impact greater than ω. Also, if λ_0 is the average frequency of events observed (that is, with an impact exceeding the collection threshold), the average frequency of the totality of events should be rebuilt (above and below the collection threshold), correcting that estimate with the relative probability of occurrence, i.e. $\frac{\lambda_0}{1-\Phi(\omega)}$. Since the correction of λ_0 can be made only if $\Phi(\omega)$ is estimated, it follows that the tracing of the impact distribution must precede that of the frequency distribution.

[16] The hybrid model is, in this regard, more vulnerable, because if, on the one hand, its realism depends on the applicability of asymptotic results (which lead to the maximum increase of the relevance threshold), on the other hand it generates risk measures sensitive to small changes (in turn induced by the scarcity of data above the relevance threshold) in kurtosis indicators. After all, in presence of a non-marginal portion of "tail" events, this model is at the moment the only one adoptable as the use of a single distribution for "shaping" both "body" and "tail" events implies the final curve’s insignificant adaptation to the latter and, ultimately, an underestimation of the higher percentiles and the related capital measures.

to achieve a reasonable representation of the kurtosis parameter while preserving the stability of results and their operational usability; if necessary, awareness of the implications of methodological choices may be increased by comparing assessments carried out by means of different estimation strategies.

The model adaptation phase may be seen as the completion of the identification process, if the intermediary indicates as “impact distribution” the one showing the best adaptation within a predetermined set.

Notwithstanding the variety of verification strategies that may be adopted [17], adaptation in extreme zones, evidently crucial for the evaluation of high-level percentiles, should be considered – as far as possible – as pre-eminent. If it is impossible to isolate a model providing an acceptable adaptation within the predefined set, solutions inspired by prudence are expected to be adopted.

Moving on to the calculation of the aggregate distribution from primary (i.e. frequency) and secondary (i.e. impacts) distributions, the most common solution – given its structural simplicity and flexibility of results – is based on the Monte Carlo methodology and consists in calculating the aggregate distribution through an artificial sampling which:

- generates an "n" determination of the random variable "N" (frequency);
- generates "n" determinations of the random variable "X" (impact);
- sums those determinations, thus obtaining a determination of "S" (total aggregate);
- repeats the sequence for a sufficiently large number of times. The "CaR" is obtained from the empirical distribution of aggregate losses [18].

[17] The basic adaptation strategies are, normally, analytical or graphic. The most common analytical strategies compare the observed significance of certain well-known non-parametric tests (Kolmogorov-Smirnov, Anderson-Darling, χ^2). Among the graphic techniques, those most frequently used concern the comparison between observed and theoretical values of the distribution function (Probability-to-Probability Plot, p-p Plot) or the percentile function (Quantile-to-Quantile Plot, q-q Plot). When choosing between analytical or graphic techniques, the trade-off between objectivity (supportive of the former) and adaptability (supportive of the latter) should be considered. Both techniques are frequently used.

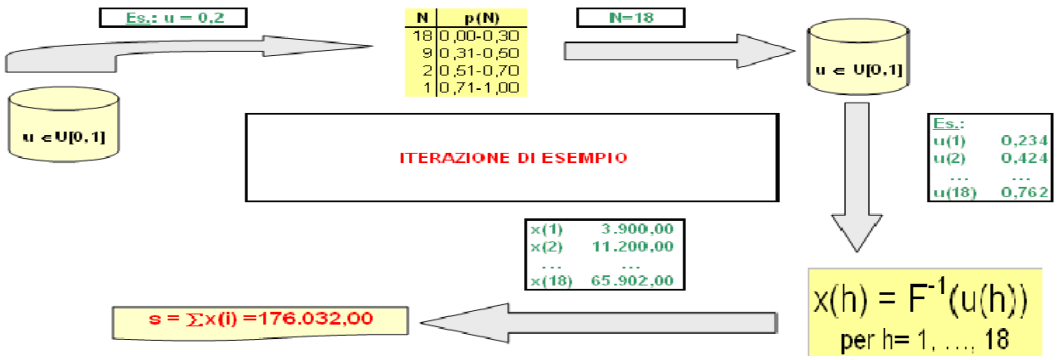
[18] The basic iteration can be schematized with the following example:

The theoretical possibility of very large artificial samples renders results generally very robust, so the problems related to the monitoring of convergence are not particularly critical. The availability of the entire aggregate distribution with a degree of accuracy that can be discretionally reduced also simplifies the construction of confidence intervals and regions of rejection. These benefits however have a cost (not to be underestimated), lying in the dynamic complexity of the procedure.

Although less adopted in practice, other numerical [19] and analytical [20] techniques exist, useful for profiling under various conditions and limits.

Intermediaries are expected to be aware of weaknesses and advantages of each aggregation technique and to select the one most appropriate for their own model; in addition to being formally justifiable, such selection is also expected to produce reliability measures of the estimate of the LDA requirement (for example, variability range and confidence intervals).

The total "CaR" of the quantitative component is the sum of class "OpCaRs", unless the intermediary uses the correlations between risk classes (see par. V.4.2).



If a fixed number of elementary iterations is set, for example, in 10^6, as many determinations of S will be obtained. Since regulations require π=0.999, the 999,000th item in the sequence of increasing "s" is the VaR estimate.

19 These techniques exploit the discretization of the impact distributions, Fourier's or Laplace's transformed, the direct numerical inversion, etc.

20 The approximation of a π level VaR in the presence of subexponential impact distributions (i.e., in essence, with extreme probabilities necessarily decaying less quickly than in exponential distribution) may occur through the so-called "Single Loss Approximation (SLA)" with "mean correction". Under the SLA, if Φ is the impact distribution and λ and μ are, respectively, average frequency and average impact, the result will be:

$$\mathrm{VaR}_\pi \approx \Phi^{-1}\left(1-\frac{1-\pi}{\lambda}\right)+(\lambda-1)\cdot\mu$$

C. The qualitative component

The qualitative component includes the scenario analysis within the model.

The role assigned to the scenarios in the internal system may vary significantly, depending on the choices made by the intermediary. In practice, there are two typical cases:

- *strictu sensu* scenarios, i.e. description of facts, realistic although very rare, not necessarily subject to a probabilistic calibration;
- subjective probabilities, or conjectures about frequency and amount of operational losses stated (by qualified experts) as probability measures.

Strictu sensu scenarios are usually constructed with reference to extreme events (for example, earthquakes, terrorist attacks, political crises, large scale illegal actions) by many experts knowledgeable on the internal situation of an individual intermediary, comparable intermediaries and the operational context.

Losses deriving from *strictu sensu* scenarios arise as "point values" and can be used in different ways. The most common practices are based on the "Loss Data Scenario – LDS", which does not allow to build a self-sufficient "OpCaR" starting from the generated points; these are usually assigned to a risk class identified within the quantitative component, contributing to enrich the record of historical losses on which the LDA model is then applied.

Special attention should be paid in excluding the possibility that the estimated losses include an implicit assessment of probability, as this might not be consistent with the overall measurement model.

The typical basic pattern of use of subjective probabilities ("Distributional Loss Scenario" – DLS) consists of two phases. In the first one:

- the scenario's granularity, i.e. the reference risk classes for probability assessments (usually organizational units, business lines, legal entities), is identified;
- the frequency and impact distributions are identified for each of the aforementioned risk classes. Such distributions do not necessarily coincide with analogous distributions used in the quantitative component; in business practices they are usually traced back to a limited reference set (usually, the Poisson for frequency and the log-normal for impact);
- a set of questions about the characteristics of frequency and impact distributions is prepared for previously identified experts.

On the basis of the experts' answers, a second phase is devoted to determining the value of the parameters of frequency and impact distributions; the characteristics of the aggregate distribution and,

ultimately, the related parameter of interest are obtained from those values (class "OpCaRDLS").

The total "CaR" of the qualitative component is obtained as the sum of class "OpCaR". It has to be stressed that, in principle, only the approach of subjective probabilities allows the self-sufficient building of an overall "OpCaR".

With reference to the DLS approach, the mathematical model underlying the queries is expected to be consistent both internally and with the LDA scheme [21]. In particular, any discrepancy between the DLS model and the statistical model incorporated within the quantitative component should be motivated whenever such differences may lead to significant reductions in the requirement; moreover, the possibility that such discrepancy is caused by the desire to impose a *de facto* limit on the variability of losses arising from the scenario should be ruled out.

D. The integration between quantitative and qualitative components

Intermediaries must take into account the four components to obtain statistically-qualified estimates. It is therefore necessary to come up with a solution on how to incorporate the various typologies of input in the overall calculation model.

Apart from the indicators of "context factors" – typically acting as adjustment parameters – the integration of the other three components is typically carried out in two possible ways:

- upstream, i.e. by homogenizing data from different sources and storing them into a unified database feeding the inferential engine;
- downstream, i.e. by applying separate procedures (also as different models) to data from different sources and integrating their final results.

There is always the possibility to combine both options in any consistent compromise approach.

The historical elements (internal and external data) are normally incorporated upstream within the quantitative component. This is done by treating external data in various ways (for example by filtering, scaling

[21] Internal consistency is broken by a set of questions likely to generate assessments inconsistent with the model (for example, if it is assumed that the impact distribution is log-normal and the expert is asked for an average value and a percentile, s/he could provide values unsuitable for any log-normal model; assuming that the impact distribution is a Weibull, the expert's answers may determine a kurtosis making the distribution not sub-exponential while such property is used); moreover, a set of questions on the frequency distribution generating - without adequate psychometric safeguards - different questions about the impact distribution and suggesting a stochastic dependence excluded by assumptions clashes with the LDA scheme.

and/or deflating the amounts) and forming a unified database with the internal data to which the LDA model is applied.

If intermediaries use *strictu sensu* scenarios (LDS approach), the integration with the LDA component typically occurs upstream, by adding conjectural to historical losses and performing a single quantification through the LDA model.

Where subjective probabilities are used (DLS approach), integration typically occurs downstream on the basis of several strategies, mainly:

- the direct Bayesian integration, which consists in obtaining an *a posteriori* distribution of the quantile of interest and deriving a parameter from it (usually a position parameter) as a single index of risk;
- the integration by means of "credibility", which ultimately consists in finding the optimal weight "z" (the "credibility factor") within the weighted average:

$$\mathbf{OpCaR = z \cdot OpCaR_{LDA} + (1\text{-}z) \cdot OpCaR_{DLS}}$$

In traditional applications, the relative importance of quantitative and qualitative components in AMA models may vary greatly, depending on the availability of data and the situation of the operational context. Intermediaries are expected to be able to estimate and justify the weight assigned to each of the two components.

E. Correction parameters

The direct use of context factors indicators usually envisages the construction of correction parameters of the final requirement; the most immediate approach uses a multiplicative correction, based ultimately on structuring a causal connection between context factors indicators and operational losses for each risk class. A rate of variation on the normal level can be derived from that connection; it can be directly multiplied by the class “OpCaR” if the measure is positively homogeneous, as it can reasonably be supposed.

Especially critical in this approach are the lack of synchronization between data collection on operational losses and recording of the indicators, as well as possible qualitative dissimilarities between loss data and indicators.

The whole issue has not yet found a universally shared theoretical framework.

(text omitted)

V.3 Information systems

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V.3.2 Expected firm practices

Intermediaries should implement adequate technological infrastructures to support operations (i.e. making data collection easier for users) and provide a calculation engine for measuring the exposure to operational risk and calculating the capital requirement.

Development and proper management of the IT Infrastructure are, however, rather complex due, among other things, to the presence of inputs different in nature and origin (i.e. internal data of all Italian/foreign subsidiaries, external data), to the creation of outputs that may be compared and integrated and to the production of reports personalized according to the typology of the recipient.

The need to ensure quality information (both in input and output) on operational risk calls for the definition of processes ensuring high-quality information flows.

To reach this target, the intermediary is expected: a) to identify processes and data owners; b) to adequately define responsibilities, taking into account the need for control and separation of roles; c) to ensure a regular update of the technical documentation.

A clear and complete identification of the functional standards of the IT solution supporting the operational risk management and measurement processes is essential to ensure the quality of applicative procedures. In this context, the intermediary is expected to proceed towards the progressive engineering of the model feeding sources, limiting manual input to the instances where information is not processed by corporate procedures.

The technological infrastructure supporting the reference framework is usually characterized by a thick network of relationships among the various applications. Because of the system's complexity and due to the internal and external relevance of the information gathered and produced, the intermediary should choose a structured methodology of software development, in line with the market best practices.

The system validation phase is expected to be conducted by a team different and independent from the staff writing the software; this phase is directed at certifying the absence of procedural errors and the substantial correspondence between what is described in the user specifications and the functionalities actually implemented. The final testing is particularly delicate and complex, especially with regard to the calculation engine, because it should also involve professionals with adequate expertise on statistical models. For each version of the applications produced, the

certification of acceptance by the final users ("user acceptance test"), integrated with the copies of software and data used in the tests, should be retained.

Finally, the whole sub-system should be part of the corporate plan for operational continuity, and the adopted security measures should guarantee data integrity, system availability and an adequate level of confidentiality of the information processed.

(text omitted)

V.4 The capital requirement: reductive factors and allocation in groups

(text omitted)

V.4.1 Expected losses

(text omitted)

V.4.1.2 Expected firm practices

Several functions available in literature may ideally pursue the objective of providing a representation of the data "expected value". However, given the peculiarity of operational risks, the simple arithmetic average is not, in general, a stable or robust indicator, especially in the case of data distribution with thick tails as it is very sensitive to extreme data.

Thus, the intermediary is expected to opt for trimmed or weighted averages or for ordinal statistics, like the median, that allow to get better information on expected losses in terms of stability and robustness.

(text omitted)

V.4.2 Correlations

(text omitted)

V.4.2.2 Expected firm practices

The intermediary is expected to specify the concept of interdependence among data of each risk class according to prudence, accessibility and adherence to corporate reality.

A prudential evaluation takes adequate account of the interdependence among extreme events; furthermore, estimates of correlations (in a wide sense) have to be reliable and robust, then based on quantitatively and qualitatively adequate information.

Whenever the opinion of experts is essential in the estimation of correlations, these are subject to the same restrictions and safeguards envisaged for the qualitative component of the model.

It is anyway a duty of the intermediary to periodically disclose the methods of estimation as well as their reliability, robustness, realism and conservativeness.

Within an LDA methodology, the structure of correlation can be identified in relation to frequency, impacts and their aggregation [22].

The intermediary is expected to set an upper limit to the diversification benefit, linked to prudential principles.

Whatever the solution adopted, it needs to be possible to calculate both a "diversified OpCar" and a "non-diversified OpCar", so that the benefit of diversification can be measured.

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V.4.3 Operational risk transfer

(text omitted)

V.4.3.2 Expected firm practices

Reimbursements and recoveries associated with a risk class depend on quantities (like credit limits, exemptions, overdrafts, statistical indexes, correlations, rates) which are at all effects model parameters; estimation methodologies, robustness characteristics and prudential impacts should thus be developed for them in coherence with what is done for the risk assessment model.

The so-called “residual risks” should therefore be adequately assessed in modeling the capital coverage; that is:

- the “coverage mismatching”, caused by the lack of correspondence among risk classes and types of insured accidents (or among the quantities underlying the financial transfer instruments and the operational losses);
- the “payments uncertainty”, that is the legal risk embedded in the contracts used, in terms of their (potential) unexpected inability to cover losses because of merely formal reasons;
- the “liquidity risk”, i.e. the time mismatch between operational loss and the associated reimbursement or recovery.

Those elements should determine a benefit reduction.

[22] Usually, the correlation among frequencies does not cause relevant repercussions on diversification; this is particularly valid in models with sub-exponential impacts (like the hybrid model). Furthermore, the correlation among aggregate losses is little stabilized both in theory and in practice. As a result, at present the correlation among impacts assumes a relevant role (if not an exclusive one) for determining the benefits of diversification among classes of operational risk.

(text omitted)

V.4.4 Allocation of the capital requirement in groups

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V.4.4.2 Expected firm practices

Regulations do not provide detailed instructions on what methodologies can be used for allocating the operational risk capital requirement within the group. However, due to the delicate role assigned to the results of this process, the criteria for the requirement allocation have to be fully integrated in the evaluation model and assisted by the same safeguards.

Allocation schemes imply methodological choices that should be formally rigorous, be accurately documented and be guided as much as possible by drivers sensitive to each risk component.

Also taking into account the still incomplete development of the relative techniques, allocation criteria based on simple reference variables of the pertinent operational segment can be accepted, e. g.:

- the contribution of each segment to the amount of the relevant indicator or of the consolidated requirement, calculated on the standardized method;
- the assigned percentage of the group's annual operational losses;
- some context factors (number of staff, volume of activity, etc.).

(text omitted)