This module should be read in conjunction with the Introduction and with the Glossary, which contains an explanation of abbreviations and other terms used in this Manual. If reading on line, click on blue underlined headings to activate hyperlinks to the relevant module.

Purpose

To set out the approach which the HKMA will adopt in the supervision of AIs' counterparty credit risk ("CCR"), and to provide guidance to AIs on the key elements of effective CCR management

Classification

A non-statutory guideline issued by the MA as a guidance note

Previous guidelines superseded

This is a new guideline

Application

To all AIs

Structure

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1. Introduction

1.1 Terminology[1]

1.1.1 For the purposes of this module,

- "CCR" means the risk that the counterparty to a transaction may default before the final settlement of the transaction's cash flows. However, an economic loss would only occur if the transaction with the counterparty has a positive economic value at the time of default. CCR thus involves a bilateral risk of loss to either counterparty to the transaction, depending on the market value of the transaction which may vary over time with the movement of underlying market factors;

[1] For the avoidance of doubt, certain terms referred to in this subsection (e.g. current exposure, OTC derivative and potential exposure) are defined in the context of CCR management. The definitions may therefore differ from those set out in the Banking (Capital) Rules for the same terms.

- "CCR exposure" means a credit exposure that gives rise to CCR;
- "current exposure" is the larger of zero or the market value of a transaction that would be lost upon the default of the counterparty to the transaction, assuming no recovery on the value of the transaction in default. Current exposure is often also referred to as replacement cost;
- "general wrong-way risk" arises when the probability of default of counterparties is positively correlated with general market risk factors. For example, fluctuations in interest rates may cause changes in the value of a derivative transaction and affect the creditworthiness of the issuer of that derivative transaction;
- "leverage" means the amplification of return (positive or negative) that occurs when a party takes on exposure that is not completely funded by the party's own equity. Leverage can exist when: (i) financial assets exceed capital; (ii) the change in value of a position can exceed the amount paid for it; or (iii) a position's price volatility exceeds that of the underlying market factor (i.e. embedded leverage);
- "long settlement transaction" is a transaction where the counterparty to the transaction has a contractual obligation to deliver a security, a commodity, or a foreign currency amount against cash, other financial instruments, or commodities, or vice versa, at a settlement or delivery date that is more than the lower of the market standard for the particular transaction (e.g. the market norm for the settlement of a USD forward exchange contract in Hong Kong is T+2 days) and five business days after the date on which the AI enters into the transaction;
- "margin lending transaction" is a transaction in which an AI extends credit in connection with the purchase, sale, carrying or trading of securities against the value of the securities which are held as

collateral. A loan that happens to be collateralised by securities does not fall within this definition;

- "over-the-counter derivative" ("OTC derivative") is a derivative contract which is not traded on an exchange. Examples of such contracts include exchange rate contracts, interest rate contracts, equity contracts, commodity contracts and credit derivative contracts;
- "potential exposure" is an estimate of the additional exposure of a transaction (i.e. in excess of its current exposure) that an AI may assume during the life of the transaction as a result of changes in market conditions. It is primarily a function of the remaining time to maturity and the expected volatility of the price, rate or index underlying the contract;
- "securities financing transactions" ("SFTs") include such transactions as repurchase agreements (i.e. repos), reverse repurchase agreements (i.e. reverse repos), securities lending and borrowing, and margin lending transactions where the value of transactions depends on market valuation and the transactions are often subject to margin requirements; and
- "specific wrong-way risk" arises when the exposure to a counterparty is positively correlated with the probability of default of the counterparty due to the nature of the transaction with the counterparty. For example, a company writing put options on its own shares creates specific wrong-way risk to the buyer of the options.

1.2 Background

1.2.1 CCR represents a major source of credit risk for AIs which engage in trading or capital market transactions.[2] Such transactions typically involve OTC derivatives, SFTs and long settlement transactions. With the continued growth of the OTC derivative market in Hong

[2] Another common form of credit risk is issuer credit risk, which is the risk of default or credit deterioration of the issuer(s) of financial instruments that are held as long positions in an AI's books.

Kong[3] and AIs' increasing use of financial instruments and structured products for yield enhancement and/or risk management purposes, it is essential for them to have the necessary systems and expertise for managing any CCR associated with those activities.

1.2.2 The importance of effective CCR management is also underlined in major financial crises that happened in recent decades (e.g. the 1997/1998 Asian financial crisis, the 2007 U.S. sub-prime crisis[4], etc.). Credit risk, in particular CCR, characterised by concerns about the creditworthiness of counterparties or institutions in the affected markets, is often seen as a key factor affecting the severity of those crises. Moreover, the close links between credit, market and liquidity risks, which tended to feed on each other during the crises, cannot be ignored in CCR management. In the 2007 U.S. sub-prime crisis, for example, market concerns about the credit quality of sub-prime mortgages in the U.S. and the value of related mortgage-backed securities led to, among other things, the widening of credit spreads, massive write-downs in the value of structured transactions and the evaporation of market liquidity, which in turn eroded the funding liquidity of individual institutions, as well as market confidence in these institutions.

1.3 Scope

1.3.1 This module is intended to provide relevant guidance that AIs could adopt in their CCR management systems, and help them evaluate the adequacy and effectiveness of their CCR management. The HKMA's supervisory approach to CCR is also described.

1.3.2 In developing this module, the HKMA has made reference to -

[3] According to the Hong Kong results of the Bank for International Settlements Triennial Survey of Foreign Exchange and Derivatives Market Turnover in 2007, the average daily turnover of OTC derivatives rose by 58.2% to US$23.6 billion compared with the previous survey.

[4] The 2007 U.S. sub-prime crisis referred to in this module includes the subsequent chain of events that developed into a global financial crisis.

- the sound practices for CCR management and other related provisions set out in the Basel II framework[5];
- the supervisory requirements of other major regulators concerning CCR management;
- relevant recommendations and observations on risk management practices made by other international organisations or supervisory groups (e.g. the Financial Stability Forum [6] and the Senior Supervisors Group[7]) in the aftermath of the 2007 U.S. sub-prime crisis; and
- industry standards and practices on CCR management[8].

1.3.3 This module should be read in conjunction with IC-1 "General Risk Management Controls" and CR-G-1 "General Principles of Credit Risk Management". The risk management criteria and sound practices contained therein are also applicable to effective CCR management.

1.4 Implementation

1.4.1 AIs are expected to have in place CCR management policies, processes and systems that are commensurate with the sophistication and complexity of their activities and exposures that give rise to CCR.

1.4.2 AIs should incorporate the risk management guidance laid down in this module into their CCR management systems as soon as practicable, but not later than nine months from the issue date of this module or such

[5] For details, see para. 777 of, and Annex 4 to, "International Convergence of Capital Measurement and Capital Standards" ("Basel II framework") issued by the Basel Committee in June 2006.

[6] The Financial Stability Forum, of which the HKMA was a member, consisted of regulatory agencies from the G-7 countries and other prominent regulators. It was turned into the Financial Stability Board, with the inclusion of new members, after the G20 Summit in London in April 2009.

[7] The Senior Supervisors Group is made up of seven participating supervisory agencies from France, Germany, Switzerland, the United Kingdom and the United States.

[8] Among others, the recommendations related to CCR management set out in the reports issued by the Counterparty Risk Management Policy Group ("CRMPG") in June 1999, July 2005 and August 2008 were taken into consideration.

further period as may be agreed with the HKMA.[9] The HKMA will monitor AIs' progress in meeting the relevant standards in the course of ongoing supervision.

2. Nature of CCR

2.1 Characteristics of CCR exposures

2.1.1 This subsection provides some guidance for AIs to identify their activities or transactions that give rise to CCR.

2.1.2 CCR may stem from credit exposures to counterparties in both the banking book and the trading book of AIs, irrespective of the types of counterparty concerned. As mentioned in para. 1.2.1 above, the types of transactions that normally incur CCR include OTC derivatives, SFTs and long settlement transactions which AIs may enter into in the course of conducting trading or capital market transactions.[10] Such transactions usually exhibit the following characteristics:

- the transactions generate a current exposure or market value;
- the transactions have an associated random future market value based on market variables (i.e. potential exposure);
- the transactions generate an exchange of payments or an exchange of a financial instrument (including commodities) against payment;
- the transactions are undertaken with an identified counterparty against which a unique probability of default can be determined;
- the positions are frequently valued (usually on a daily basis), according to changes in market variables;

[9] This grace period is only applicable to existing AIs at the issue date of the module.

[10] These transactions are subject to a CCR capital charge under the Basel II framework.

- similar to general credit risk management, a number of credit risk mitigating measures, such as collateral, margining and netting arrangements, may be adopted in such transactions; and
- short-term financing may be a primary objective in that the transactions mostly consist of an exchange of one asset for another (cash or securities) for a relatively short period of time, usually for business financing purposes.

2.1.3 While CCR exposures and other non-CCR credit exposures (e.g. loans) have similar risk management considerations in many aspects, they have fundamental differences as highlighted below.

Loan exposure	CCR exposure
One-way risk of loss: only the lender is exposed to potential credit loss	Bilateral risk of loss: either party to a transaction may suffer credit loss depending on the market value of the transaction at the time of counterparty default
Exposure to the lender is always positive	Exposure to the counterparty can be positive or negative. An AI is only subject to CCR whenever the contract is "in the money", i.e. having a positive exposure, during the life of the contract
Loan principal is always exchanged	Notional principal may or may not be exchanged
Exposure can be easily measured (e.g. a loan exposure generally amounts to the loan principal)	Exposure is contingent on the value of the underlying assets and market factors, and can only be estimated (i.e. the sum of current exposure and potential exposure)

2.1.4 There could be situations in which AIs may regard the CCR associated with some transactions as eliminated.[11] For example, the trading and settlement of financial instruments through a central counterparty (such as an exchange or clearing house) can eliminate CCR for the contracts involved on the basis that the central counterparty, which interposes itself between counterparties to the contracts traded in a financial market, acts as the buyer to every seller and the seller to every buyer, guarantees the payment obligations under the contracts, and has its CCR exposures under the contracts fully collateralised.

2.1.5 AIs should define clearly in their CCR management policies the relevant assessment criteria for excluding certain CCR exposures from the CCR management framework. The criteria and the types of exposures so excluded should be subject to regular review by senior management and updated when necessary.

2.2 Pre-settlement risk versus settlement risk

2.2.1 CCR has two components, viz. pre-settlement risk and settlement risk.

2.2.2 Pre-settlement risk is the risk of loss due to a counterparty defaulting on a contract or agreement during the life of transaction. However, the level of exposure varies throughout the life of the contract and the extent of losses will only be known at the time of default.

2.2.3 Settlement risk is the risk of loss due to the counterparty's failure to perform its obligation after an AI has performed its obligation under a contract or agreement (through either an advance of funds or securities) at the settlement date. Failure to perform at the settlement date can arise from a number of reasons including counterparty default, operational problems and market liquidity constraints. AIs may draw reference from section 6 of TA-2 "Foreign

[11] See paras. 6 to 8 of Annex 4 to the Basel II framework for more details about those transactions in which the associated CCR can be attributed as zero.

Exchange Risk Management" for guidance on the management of settlement risk.

3. Supervisory approach to CCR

3.1 Risk-based supervision

3.1.1 CCR is a form of credit risk which, together with the other seven inherent risks[12], is covered under the HKMA's risk-based supervisory approach. AIs are required to establish a sound and effective system to manage each of these risks.

3.1.2 Continuous supervision of AIs' CCR is achieved through a combination of on-site examinations, off-site reviews and prudential meetings. The main objectives are to assess the adequacy and effectiveness of their CCR management, and the level and trend of their CCR exposures. See SA-1 "Risk-based Supervisory Approach" for details of the HKMA's risk-based supervisory methodology.

3.1.3 In the case of locally incorporated AIs, the adequacy of their capital relative to the level of CCR and the soundness of their CCR management will also be assessed as part of the HKMA's supervisory review process (see CA-G-5 "Supervisory Review Process" for more details).

3.1.4 Where an AI is part of a local banking group with centralised CCR management systems, the HKMA will assess such systems on a group basis. Where the banking group is foreign-owned, the HKMA will take into account any group-wide CCR management policies, systems and controls that may be applicable to the AI (and whether they have been tailored to suit local circumstances). Where appropriate, the HKMA may obtain relevant information or comments from the home supervisor of the AI's head office or parent bank for reference.

[12] They are market, interest rate, liquidity, operational, legal, reputation and strategic risks.

3.1.5 In the above cases, the AI's management should be able to explain and demonstrate to the HKMA's satisfaction that the relevant group-wide CCR management policies, systems and controls are appropriate for controlling its CCR exposures. The AI should also provide the HKMA, where necessary, with any information, documentation or evidence that the HKMA may require for considering and ascertaining whether the relevant CCR management policies, systems and controls are acceptable to the HKMA.

3.1.6 Results of the above assessments by the HKMA, together with the assessment results for other inherent risks, will be used for determining the overall risk profile and supervisory priorities of AIs and, in the case of locally incorporated AIs, their minimum capital adequacy ratio.

3.1.7 In assessing the adequacy and effectiveness of an AI's CCR management, the HKMA will take into account the following factors:

- the nature, complexity and level of the AI's CCR exposures;
- the adequacy and effectiveness of the AI's corporate governance practices, including the level of oversight exercised by the Board and senior management on CCR-related activities;
- the knowledge and ability of the AI's management in identifying, assessing, monitoring and controlling CCR;
- the adequacy of, and the extent of compliance with, the AI's CCR management policies and procedures;
- the appropriateness of the AI's CCR measurement, monitoring and management information systems;
- the adequacy and effectiveness of the AI's internal risk limits for controlling CCR, stress-testing procedures and other risk mitigating practices;
- the robustness of the AI's systems for conducting internal reviews and audits of its CCR management processes;

- the adequacy and effectiveness of the AI's CCR management practices and strategies, as evidenced from past and projected financial performance; and
- the appropriateness of the AI's level of CCR in relation to its earnings, capital and risk management systems.

3.1.8 Section 4 below provides further guidance on the above assessment factors.

3.2 Capital adequacy framework *(for locally incorporated AIs)*

3.2.1 As in the case of other credit exposures, CCR exposures are subject to capital charge under the revised capital adequacy framework in Hong Kong. AIs are required to calculate and provide adequate capital for their CCR exposures (whether in the banking book or trading book) in accordance with the requirements of the Banking (Capital) Rules ("CRs").

3.2.2 At present, the CRs require AIs to use: (i) the current exposure method (i.e. current exposure plus potential exposure) to calculate the CCR of their OTC derivatives; and (ii) the simple approach, the comprehensive approach with supervisory haircuts or the value-at-risk model, where applicable, to calculate the CCR of their repo-style transactions and other capital market transactions.

3.2.3 The HKMA will determine in due course the approach and timeframe for amending the CRs to make available to AIs the more advanced CCR calculation methods (i.e. the internal model method and the standardized method) and cross-product netting[13] arrangements under the Basel II framework. This will take account of relevant lessons of the 2007 U.S. sub-prime crisis, evolving developments in banking activities and financial markets, the adequacy and readiness of AIs' CCR management systems, and international standards and practices. AIs which aspire to

[13] Cross-product netting allows positive and negative mark-to-market values to offset each other across trades in different financial instruments and product categories.

adopting the more advanced CCR calculation methods should develop and upgrade their CCR management systems, having regard to the relevant provisions set out in the Basel II framework.

3.3 Disclosure *(for locally incorporated AIs)*

3.3.1 AIs using the standardized approach or internal ratings-based approach for the calculation of credit risk capital charges are required to make general qualitative and quantitative disclosures on CCR in accordance with §58 and §80 of the Banking (Disclosure) Rules, and paras. 16.5 and 18.4 of CA-D-1 "Guideline on the Application of the Banking (Disclosure) Rules". For instance, these AIs should describe the methodology they use to assign internal capital and credit limits for CCR exposures and their policies for securing collateral and establishing provisions.

4. Key elements of effective CCR management

4.1 Corporate governance

General

4.1.1 Sound corporate governance is essential to effective CCR management. General requirements and practices relating to corporate governance, including the oversight role and risk management responsibilities of the Board (or its delegated committee) and senior management, are cited in the SPM modules of CG-1 "Corporate Governance of Locally Incorporated Authorized Institutions", IC-1 "General Risk Management Controls" and CR-G-1 "General Principles of Credit Risk Management".

4.1.2 This subsection focuses on some facets of corporate governance that are particularly relevant to CCR management, in the light of experiences and lessons drawn from major financial crises in recent years (notably the 2007 U.S. sub-prime crisis).

Firm-wide risk management approach

4.1.3 While there is no single model for a sound corporate governance framework, AIs should seek to ensure that their governance structure and practices are conducive to a firm-wide approach to risk management. In particular, AIs should encourage an integrated approach to managing firm-wide risks (e.g. credit, market and other major risks) and promote continuous dialogue and information sharing between business units and independent support and control functions (e.g. risk management, legal and compliance, operations and audit) at the senior level in respect of risk profiles and exposures across the organisation. This will help reduce the risk that business decisions are made in isolation by individual business units without gaining the insights of other areas, and enable critical issues and developments to be given due management attention.

Risk management oversight

4.1.4 The Board and senior management should be actively involved in the CCR management process, and should regard this as an essential aspect of the business to which adequate resources need to be devoted. In their oversight of the related business operations, they should ensure that business decisions made reflect an appropriate balance between risk appetite and risk controls. This could be achieved, for example, by -

- implementing business strategies that align with the risk appetite and tolerance level approved by the Board. For large and complex AIs, their risk appetite should be periodically reviewed, taking into account quantitative risk metrics (including inputs from scenario analyses and stress-testing) and qualitative factors such as compensation systems, the quality of risk controls, and the point in the business cycle;
- ensuring that the risk management and control infrastructure is commensurate with, and can fully support, the pace of business growth (particularly

in relation to complex structured products or other high risk activities); and

- putting in place compensation or incentive schemes that discourage excessive risk-taking in the short-run.

4.1.5 In order to sustain the control environment across front-line business units, the Board and senior management should ensure that the risk management and other support and control functions are robust, truly independent from the risk-taking functions (both in terms of decision-making and reporting structure), and have sufficient authority, resources and expertise to carry out their functions.

Risk management expertise

4.1.6 Senior management should have an adequate understanding of the CCR products and activities being undertaken, the associated risks and control systems involved, as well as the key assumptions and limitations of the various valuation and pricing methodologies and models employed for risk management purposes. They should also emphasise the recruitment, training and retention of skilled analysts and risk managers who have sufficient product knowledge and expertise to manage the risks involved.

4.1.7 Senior management have a responsibility to understand and act on emerging risks. This calls for the need to have senior executives who possess expertise in a range of risks, and there is value in setting up a risk management committee comprising senior executives from key business units and independent support and control functions to assess and monitor CCR-related risks.

Risk management reporting

4.1.8 AIs should ensure that their information systems and processes allow for a robust and prompt assessment of risks, with the provision of timely, accurate and useful information to the Board and senior management to enable early investigation of signs of emerging risks

and formulation of responsive strategies to deal with the changing risk landscape.

4.2 Risk management policies and procedures

4.2.1 AIs should have in place CCR management policies and procedures that are clearly defined, conceptually sound and consistent with the nature, complexity and level of their CCR activities and exposures. The CCR management policies of an AI should be documented, approved by the Board (or its delegated committee), communicated clearly to relevant staff at all levels, and regularly reviewed and updated to reflect changing circumstances and developments in the AI and the market environment in which it operates.

4.2.2 AIs are expected to cover the following aspects in their CCR management policies and procedures:

- a definition of CCR, taking into account both pre-settlement and settlement risk exposures. This definition should help the AI in identifying CCR in different business activities[14];
- the AI's risk appetite and tolerance for CCR, which should be consistent with its overall risk appetite and appropriate for its business objectives and financial capacity;
- the governance and control structure, which defines the roles and responsibilities of the Board, firm-wide committees, senior management, business units, and independent support and control functions involved in CCR management and their reporting relationships;
- the approach for identifying, measuring, monitoring, controlling and reporting the AI's CCR exposures, which should, inter alia, include the following:
  - the identification of, and approval for, new business products or activities that give rise to

[14] AIs are encouraged to examine their business activities and consider the need for extending the guidance of this module to activities beyond OTC derivatives, SFTs and long settlement transactions set out in para. 2.1.2 where those activities are assessed to be associated with material CCR.

CCR (as well as the post-approval review of such products or activities);

- the underwriting standards and controls for credit initiation, assessment, approval and review of counterparties (see also subsection 4.3 below) as well as documentation standards;
- the type and nature of information to be obtained from counterparties for credit assessment, and the related controls on the use of, and access to, such information (particularly in respect of information obtained on a confidential basis);
- the methodologies, models and standards used for measuring and valuing the CCR exposures of different types of activities or transactions, taking into account associated risks (such as market, liquidity, legal and operational risks) and, to the extent practicable, their correlations;
- the eligible CCR mitigation methodologies and related controls;
- the CCR limit structure and monitoring of limit usage;
- the management reporting system on CCR exposures and on compliance with established policies, limits and procedures;
- the controls on exceptions such as limit excesses and transactions requiring special approval, for example, when the collateral offered is not presently recognised as eligible collateral by the AI, or there are issues in the legal enforceability of transaction documents;
- the policies and procedures for managing documentation risk (e.g. timely execution of contracts, use of standard documentation, etc.), taking into account the nature and scope of the business and risk profile, as well as market practices;
- the stress-testing procedures and stress scenarios applicable to CCR exposures; and

- the framework for conducting independent reviews and audits on CCR management systems.

4.3 Credit assessment and review

General

4.3.1 AIs should not engage in dealings likely to incur CCR exposures before assessing the creditworthiness of the counterparty concerned. For established counterparty relationships, there should be an ongoing review process for assessing the CCR associated with, and any significant risks (e.g. market, legal and liquidity risks) emerging from, these relationships. As CCR is a form of credit risk, AIs may refer to CR-G-2 "Credit Approval, Review and Records" for some general guidance in these respects.

Scope and key considerations

4.3.2 In conducting credit assessment and review, AIs should take sufficient account of both pre-settlement risk and settlement risk of the counterparties, and be aware of any associated wrong-way risks. Granting a credit line to an institutional investor against the pledge of the institution's own shares (e.g. for conducting OTC derivative transactions) creates specific wrong-way risk to the AI, as the risk of the "secured" portion of the exposure is positively correlated with the probability of default of the institution.

4.3.3 AIs should conduct their own due diligence on their counterparties and the quality of exposures underlying the transactions based on sufficient credit information (see also paras. 4.3.8 to 4.3.10 below). Care should be taken not to rely unduly on the credit assessment of, and credit ratings assigned by, external credit rating agencies. Such reliance, in the absence of an independent and detailed analysis of the agencies' rating criteria, may lead to complacency in accumulating large positions of highly rated but complex and illiquid financial instruments. AIs should also be alert to adverse changes in prevailing market conditions (e.g.

widening of credit spreads) that may increase the risks inherent in the transactions (e.g. price risk).

4.3.4 Traditional balance sheet or financial analysis may suffice for assessing the financial strength of many types of counterparties. However, where AIs are dealing with counterparties in transactions involving complex financial instruments (e.g. collateralised debt obligations), they should be able to understand the strategies (e.g. the use of leverage) employed by the counterparties, and analyse the effects of stressed circumstances on those transactions as well as their capability (both AIs and their counterparties) to withstand potential losses associated with the transactions (see also para. 4.6.3 below).

4.3.5 It is also important to conduct an adequate assessment of a counterparty's off-balance sheet exposures or commitments (whether contractual or non-contractual) if such exposures or commitments pose a major source of risk to the counterparty. For example, a counterparty which has sponsored a number of structured investment vehicles ("SIVs") may bear the risk of having to absorb the obligations of the SIVs or otherwise being compelled to provide liquidity support to these SIVs should they get into financial trouble so as to protect the counterparty's own reputation, market position or customer relationships.

4.3.6 AIs should ensure that the credit terms, including pricing, collateral and margining arrangements, extended to counterparties are commensurate with their assessment of the credit quality of the counterparties, the risks underlying the transactions, and the adequacy of counterparty information obtained. For example, AIs may consider collecting an initial margin from counterparties whose creditworthiness depends heavily on the performance of leveraged portfolios of financial assets to cushion the effect of large market moves in times of stress.

4.3.7 Equally vigorous credit assessment and review should be conducted on financial guarantors from whom an AI has purchased credit protection, including whether the AI's exposures to the guarantors are subject to specific

wrong-way risk. During the 2007 U.S. sub-prime crisis, concerns emerged on the ability of individual financial guarantors (particularly monoline insurers) to honour their obligations under structured transactions, and the materiality of financial institutions' exposures to the guarantors. As some of these guarantors were active in insuring exposures to securities that incorporated sub-prime mortgages, they were actually more vulnerable to the decline in the value of such securities than those institutions seeking protection. As a result, the creditworthiness of the guarantors was correlated with the valuation of the exposures covered by their guarantees (an example of specific wrong-way risk). AIs should thus carefully assess and control any concentration risk arising from over-reliance on individual credit protection providers and guard against the build-up of specific wrong-way risk in their effort to mitigate CCR.

Counterparty information

4.3.8 AIs should obtain adequate information on their counterparties to support their credit assessment and decision to trade or deal with them. More detailed counterparty information is warranted in cases where the dealings with a particular counterparty are likely to entail significant CCR exposure or where the counterparty conducts highly leveraged activities. As recommended by the CRMPG[15], such information may include -

- material financing and counterparty relationships;
- specific trading and investment strategies and asset allocations;
- operating controls, including information on valuation and procedures on trade verification, collateral management and settlement;

[15] See the report "Improving Counterparty Risk Management Practices" issued by the CRMPG in June 1999 for more details.

- information on risk management approach and controls, as well as risk management methods and risk measurements;
- capital condition, financial performance and market risk;
- asset liquidity risk and funding liquidity risk assessments[16]; and
- material events affecting the counterparty's credit quality (e.g. increase in collateral requirements due to rating triggers).

4.3.9 The scope, quality, timeliness and availability of the information requested should be an important ongoing consideration in determining the amount and terms of credit to be provided to the counterparty. During periods of systemic and institutional stress, such as the heightened market turbulence and volatility observed in the wake of the U.S. sub-prime crisis, additional information should be obtained from major counterparties for an updated assessment and review.

4.3.10 To encourage the provision of adequate proprietary information, AIs should establish control policies and procedures governing the use of, and access to, confidential information provided by their counterparties for credit assessment purposes. AIs should also, either through formal or informal confidentiality arrangements, reach an understanding with the counterparties concerned regarding the use of their proprietary information and on the safeguards against its unauthorized use.

Expertise in credit analysis

4.3.11 AIs should ensure that their staff responsible for conducting counterparty credit assessments have an appropriate level of skills and experience. They should

[16] Asset liquidity risk refers to the risk that an institution cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption. Funding liquidity risk is the risk that an institution will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or its financial condition.

possess analytical capabilities in respect of derivatives and other financial instruments and the expertise necessary to evaluate the information obtained from counterparties.

4.4 Risk measurement and valuation

Methodologies and key considerations

4.4.1 AIs should establish CCR measurement systems that encompass all significant activities and transactions generating CCR exposures, and are capable of providing CCR measures across business lines and on a firm-wide basis. The sophistication of the measurement systems should be commensurate with the nature, complexity and level of an AI's CCR exposures, the quality of the AI's risk measurement capabilities, as well as the ability of its management to understand the nature, limitations and implications of the results produced.

4.4.2 There are various CCR measurement methodologies along a continuum of sophistication in risk management practices. These range from simple measures to sophisticated statistical modelling or simulation techniques, which are highlighted as follows:

- Original exposure method - this is simply based on the notional amount of the contract;
- Current exposure method - this is simply the sum of a positive mark-to-market value and the potential exposure as captured by an "add-on" (this can be a percentage of the notional amount of the contract, and may vary for different types of instruments or tenors);
- Standardized method - this method is set out in the Basel II framework as an intermediate approach between the current exposure method and the more advanced methods mentioned below. Under this method, OTC derivative transactions are mapped to risk positions that represent certain key drivers of potential change in value, using a mapping technique commonly employed in market risk

modelling, for estimation of the exposure values; and

- Statistical or simulation methodologies - these methodologies are used to estimate the probable values a contract may reach over a specified time horizon. An example of such methodologies is the internal model method[17] (which requires a one-year horizon) as prescribed in the Basel II framework.

4.4.3 A key issue in CCR measurement is the estimation of the potential exposure of a contract, which varies over the life of the contract as the underlying market factors change. As a contrast, determination of the current exposure or the settlement exposure of the contract is more straightforward. Current exposure generally amounts to the mark-to-market value (if positive) of the contract, and the settlement risk is the full value of the payment (either in the form of funds or financial instruments) made by an AI before its counterparty meets a counter-payment or delivery obligation.

4.4.4 Potential exposure is measured more subjectively than current exposure, and may be reflected by different exposure measures, such as peak exposure, expected exposure, effective expected exposure, expected positive exposure and effective expected positive exposure, etc. (see Annex 4 to the Basel II framework for the definitions of these terms). Estimation of such exposure measures usually requires the use of internal models (see also paras. 4.4.16 and 4.4.17 below).

4.4.5 Different CCR measures may provide different views of risk, and thus may serve different risk management purposes. For example, an AI may measure -

- the current exposure, gross and net of collateral, for re-margining purposes;

[17] The HKMA does not require or mandate any particular AI or groups of AIs to use the internal model method for risk management purposes. AIs are expected to choose the appropriate measurement method based on their individual circumstances, including the nature, complexity and level of CCR posed by their credit exposures.

- the peak exposure at both the counterparty and portfolio levels for limit setting and monitoring purposes; and
- the expected exposure, when combined with probabilities of default, for pricing credit risk.

4.4.6 Where practicable, AIs should consider using a wider range of CCR measures and not being too dependent on a single methodology or a limited set of tools. For instance, it would not be acceptable if AIs use only the notional amount for risk measurement. Nevertheless, this risk measure may be used as a supplementary tool for highlighting potential concentrations. Use of both gross and net risk measures has similar benefits. AIs should also ensure that the risk measures capture both on- and off-balance sheet exposures (such as committed funding arrangements).

4.4.7 AIs may also consider adopting more flexible risk measurement processes and systems that permit the adaptation of models and input parameters so that changes in market conditions can be incorporated, thus supporting more timely risk identification, analysis and control.

Measurement of risk concentrations

4.4.8 AIs' CCR measurement systems should enable the identification of large or concentrated positions, such as -

- by groups of related counterparties;
- by customer investment strategies;
- by market and industry sectors; or
- by underlying market factors (e.g. interest rates and exchange rates).

4.4.9 To control risk concentrations, AIs are recommended to adjust quantitative measures of potential exposure to counterparties subject to margining requirements, taking into account exceptionally large positions, as well as concentrations in less liquid instruments. The adjustment should anticipate potentially protracted

periods required for unwinding positions and the risk of price gapping during the unwinding process.

Valuation practices

4.4.10 AIs should develop and apply strong, consistent and independent price verification procedures. This may entail independent and regular reviews (and challenges) of the valuation methodologies, assumptions and price estimates provided by business units or external rating agencies; as well as the exercise of expert judgement. Management and risk control staff involved should have adequate relevant knowledge and expertise.

4.4.11 There should also be a consistent and disciplined approach to the application of estimated prices across the applicable assets and exposures within an AI both on a solo and a consolidated basis. Special consideration should be given to tailor-made, structured or illiquid products, and assets that are difficult to price. A robust monitoring process should be employed to track stale prices and escalate unresolved issues.

4.4.12 AIs should incorporate relevant risks that can be associated with CCR (e.g. market and liquidity risks) into the valuation of CCR exposures. This is because -

- the credit and market risks associated with a CCR exposure are closely intertwined. A CCR exposure is dependent on the current mark-to-market value as well as movements in the probable value of the exposure during the life of the contract. Thus the volatility of the contract's underlying market factors (e.g. exchange rates, interest rates and credit spreads), and the correlations among the market factors and between credit and market risks, all play a part in the valuation of the exposure; and

- market liquidity could also have a profound impact on the valuation of contracts at times of market stress, as the value of some financial instruments may plummet or become indeterminate due to

evaporation of market demand as witnessed in the 2007 U.S. sub-prime crisis.

4.4.13 For active market participants, revaluations should be performed on both an intraday as well as a daily basis. If marking-to-model is used for valuation purposes, the assumptions and methodologies used should be consistent and reasonable, and should be subject to periodic independent reviews (see also paras. 4.4.16 and 4.4.17 below).

4.4.14 AIs should establish internal CCR cost allocation and valuation practices that provide incentives for business managers (credit and trading) to manage proactively their CCR. These may include methods for recognising the cost of credit risk in internal risk assessment or capital allocation, proactive adjustments to limits as well as tools for periodically evaluating the adequacy of credit valuation provisions / adjustments to asset carrying values.

4.4.15 It would be prudent for AIs to value their complex, large or less liquid positions with more conservative assumptions. If an AI has accumulated a material position in a complex product, it is recommended to trade a portion of the product, where possible, to promote price discovery and narrow the potential for divergence between theoretical, model-driven prices and market prices.

Use of internal models

4.4.16 AIs using internal models for CCR management purposes should ensure that the models are robust, effective and capable of producing reliable risk estimates. Such models should be fully tested and validated prior to use, and the reliability of the models should be regularly reviewed through independent model verification procedures. AIs may draw reference from section 2 of CA-G-3 "Use of Internal Models Approach to Calculate Market Risk", which sets out some relevant controls on model design, development, validation, review and approval.

4.4.17 Senior management should pay special attention to the limitations and assumptions of the models used and understand the impact these can have on the reliability of model outputs. Senior management should also consider the uncertainties of the market environment (e.g. timing of realisation of collateral) and operational issues (e.g. where proxy volatility data are used as a substitute for valuing instruments that do not have a long price history of their own) and be aware of how these are reflected in the models.

4.5 Limit setting and monitoring

4.5.1 AIs should establish and enforce operating limits and other risk control practices that maintain their CCR exposures within levels consistent with their established risk tolerance, policies and strategies, and that accord with their approach to measuring and reporting CCR exposures, capital strength and risk management capabilities.

4.5.2 CCR limits should be set on the amounts and types of transactions authorized for each counterparty, with distinct limits for pre-settlement risk and settlement risk, and for individual counterparties and each group of related counterparties. Such limits should take into account the results of stress-testing (see subsection 4.7 below for details). Sub-limits may also be established for specific products (e.g. forwards, options, swaps or SFTs), market or industry sectors (e.g. financial institutions or corporates), or underlying market factors (e.g. exchange rates and interest rates).

4.5.3 AIs should, as appropriate, set limits for various exposure measures for more granular control and monitoring of CCR exposures. Examples of such limits include -

- Current exposure - measured at current market value, to include the benefit of valid bilateral netting

agreements [18] (but before consideration of any related collateral);

- Current net of collateral exposure - measured at current market value minus the net value of collateral in respect of which there is a high level of confidence about legal enforceability and perfection of security interest;
- Current liquidation exposure - measured as current net of collateral exposure based upon estimates of liquidity-adjusted contract replacement cost, the liquidation value of collateral received and the buy-in cost of collateral pledged. When estimating the liquidity-adjusted contract replacement cost, AIs should take into account: (i) the potential adverse price movements over the period of liquidation; (ii) the specific liquidity characteristics of the underlying contracts and collateral; and (iii) the potential for market illiquidity based on position size or transient shocks; and
- Potential exposure - measured on the basis of potential future market moves adjusted for collateral rights, threshold agreements, optional unwind rights as well as the shorter timeframes these rights imply.

4.5.4 AIs should set limits for pre-settlement risk based on the creditworthiness of the counterparty in much the same way as for traditional credit lines. As for the setting of limits for settlement risk, AIs should have regard to considerations other than the creditworthiness of the counterparty, such as the notional amount of the payment obligations involved, the efficiency and reliability of the relevant settlement systems employed (e.g. the use of payment-versus-payment and delivery-versus-payment systems will help eliminate settlement risk), the period for which the exposure will remain outstanding, and any associated collateral or netting arrangements.

[18] See §2 of the CRs for the definition of "valid bilateral netting agreement".

4.5.5 There should be procedures for the timely identification, reporting, investigation and resolution (approval or rejection) of exceptions to limits. Independent ongoing monitoring of exposures against established limits and margin thresholds is needed for ensuring that appropriate risk mitigating measures will be taken promptly when limits are, or are close to being, exceeded. The frequency with which CCR exposures are monitored should depend on the size and nature of the exposures. For example, an AI which is active in OTC derivative transactions should have its CCR exposures monitored on a daily and on an intraday basis.

4.5.6 Established CCR limits should be clearly communicated to, and well understood by, senior management as well as the relevant business units and the independent support and control functions (including both the middle office and back office) to ensure that there is rigorous compliance with the limits and adequate exposure monitoring and reporting. The limits should also be subject to periodic reviews by management with appropriate delegated authority. Ad hoc reviews of limits set should be performed at times of market distress or when AIs become aware of signs of deterioration in the credit quality of counterparties.

4.6 Risk monitoring and control

CCR monitoring and control

4.6.1 CCR deserves close monitoring by AIs in the light of their increasing level of participation in the OTC derivative and capital markets where complex financial instruments and structured products are traded.

4.6.2 CCR exposures should be managed as comprehensively as practicable at the counterparty level (i.e. aggregating with other credit exposures to a given counterparty), across business lines and on a consolidated basis to cover the aggregate credit exposures to the counterparty, with adjustments to reflect the effect of enforceable netting and collateral arrangements. For instance, to obtain its total credit

exposure to a counterparty, an AI may convert CCR exposures into loan equivalent amounts and aggregate those amounts with the AI's loan exposures to the counterparty for credit risk monitoring. Where possible, AIs which are active market participants may wish to assess CCR exposures based not only on their own exposures to a large trading counterparty, but also considering any available data regarding the counterparty's positions at other institutions.

4.6.3 AIs should have procedures for controlling CCR exposures when they become large, a counterparty's credit standing weakens, or the market comes under stress. AIs should also strengthen the ongoing monitoring of the risk posed by their major counterparties by adopting an integrated approach to evaluating the linkages between leverage, liquidity and market risk. For example, AIs should monitor the risk arising from the counterparties' use of leverage by considering, among other factors, the magnifying and interconnected effects of leverage, under normal and stress conditions, on their (i) market risk, (ii) funding arrangements and collateral requirements, and (iii) asset liquidity risk. AIs should also evaluate factors that may mitigate the effects of leverage.

4.6.4 AIs should be aware of exposures that give rise to a significant degree of general wrong-way risk. There should also be procedures to identify, monitor and control specific wrong-way risk, beginning at the inception of a transaction and continuing through the life of the transaction.

4.6.5 AIs should have a system in place for monitoring the value of collateral received from or posted to the counterparties, and the compliance with conditions under which AIs and the counterparties are entitled to call for additional collateral from each other or dispose of existing collateral under the terms of the contract. There should also be procedures for dispute resolution, e.g. disputes regarding margin levels.

4.6.6 AIs which are active market participants or running significant CCR exposures should have the capacity to -

- monitor risk concentrations to asset classes as well as estimated exposures, both on a gross and net basis, to all institutional counterparties in a matter of hours; and
- provide effective and coherent reports to senior management regarding such exposures to high risk counterparties,

so as to enable senior management to make better and more informed judgements and respond in a timely fashion to changing market conditions. This is particularly relevant in times of stress when models and metrics are most prone to providing false signals.

CCR control function

4.6.7 AIs should have a CCR control function. Depending on the nature, scale and complexity of an AI's CCR activities, this function may be standalone or integrated with other support and control functions.[19] The CCR control function should be independent of the business or risk-taking units, staffed with personnel of sufficient knowledge and expertise, and assigned with sufficient resources to discharge its risk control responsibilities across all relevant business units. The function should also be accorded adequate status and authority, relative to its counterpart in the business units, so as to ensure its independence and effectiveness.

4.6.8 Generally, the CCR control function should be responsible for -

- the independent credit assessment, approval (within delegated authorities) and review of counterparties;
- the design and implementation of CCR management systems, including the initial and

[19] For some AIs, the CCR control function may be shared between the middle office for credit risk management (e.g. for credit assessment, approval and review of counterparties) and for market risk management (e.g. for validation and review of AIs' valuation methodologies and models). In these cases, AIs should ensure that the party responsible for overseeing CCR is clearly designated so that CCR does not fall through the gap between credit and market risk management.

ongoing validation and review of the AI's valuation methodologies and models (where applicable);

- the daily monitoring of CCR exposures, usage of and compliance with established limits, and identification and resolution of exceptions;
- the measurement and valuation of CCR exposures;
- the design of a reporting framework and preparation of management reports to enable the Board and senior management to monitor the AI's CCR profile relative to its risk tolerance; and
- conducting stress-testing and reporting the results to the Board (or its delegated committee) and senior management (see subsection 4.7 below for details).

4.6.9 The work of the CCR control function should be closely integrated with the day-to-day credit risk management process of an AI. Its output should be an integral part of the process of planning, monitoring and controlling the AI's credit and overall risk profile.

4.7 Stress-testing

4.7.1 Stress-testing has become an increasingly important risk management tool. AIs should have a routine and rigorous stress-testing programme in place to supplement the day-to-day outputs of the CCR management systems. IC-5 "Stress-testing" provides general guidance to AIs on the use of stress tests for risk management purposes.

4.7.2 In conducting stress-testing on CCR exposures, AIs should develop stress scenarios that -

- are forward looking and representative of extreme but plausible events;
- cover both credit and market risk factors (given their close correlation);
- contain sound assumptions about the underlying markets and other parameters; and
- probe for vulnerabilities within and across key portfolios (including trading and investment

portfolios), based on inputs from relevant business managers (credit and trading) and with particular analytical focus on the impact of stress events on large or relatively illiquid sources of risks.

4.7.3 The stress tests should also be capable of assessing -

- the concentration risk both to a single counterparty and to groups of counterparties; and
- the risk that liquidating a counterparty's positions could move the market.

The impact on AIs' own positions of such market moves should be considered and integrated with their CCR assessment.

4.7.4 AIs should ensure that the major stress-testing assumptions and the limitations of the methodologies or models used are adequately understood by the parties concerned and, more importantly, there is firm commitment and support from senior management and business managers on the use of stress-testing and the related stress scenarios. AIs should also be mindful that risk analytics and metrics that are based on "normal market" price volatility, unwind periods etc. can materially understate the risks inherent in trades or portfolios during periods of illiquidity.

4.7.5 The stress-testing results should be reviewed periodically by the Board (or its delegated committee) and senior management, and should be reflected in the CCR policies and limits set by them.

4.7.6 Stress tests may be formalised so that trends and developments in key factors and exposure amounts could be tracked and analysed. Where stress tests reveal particular vulnerability to a given set of circumstances, senior management should explicitly consider appropriate risk management strategies (e.g. by hedging against that outcome, or reducing the size of the AI's CCR exposures).

4.8 Management reporting

4.8.1 The management reports prepared on an AI's CCR exposures should be comprehensive, accurate, timely and reviewed by a level of management with sufficient seniority and authority to enforce, where necessary, responsive actions (e.g. reduction of positions).

4.8.2 The comprehensiveness of report coverage and frequency of reporting for CCR management purposes should depend on the volume and complexity of an AI's CCR activities. Daily reports which include significant counterparty line usage, exceptions to limits, and profit and loss statements should be provided to the front office and relevant support and control functions for risk monitoring. More frequent and ad hoc reporting should be made as market conditions dictate. Reports to the Board (or its delegated committee) and other levels of senior management may occur less frequently, but the frequency and scope of reporting should provide these individuals with adequate information on, for example, the maturity or tenor of CCR exposures, CCR concentrations, trends in CCR exposures, trends in limit excesses, watch lists, stress-testing results and other summary reports to judge the changing nature of the AI's risk profile.

4.8.3 Senior management should receive periodic information on large CCR exposures. Such reporting should generally observe the following standards:

- aggregate exposure to a counterparty should include all material on- and off-balance sheet exposures relating to such counterparty;
- exposures should be measured under conservative assumptions as to the efficacy of netting and collateral arrangements;
- current exposure and collateral values should be measured both at market and estimated liquidation value;

- potential exposure measures should be robust and appropriately reflect risk reduction and risk mitigating arrangements; and
- quantitative and qualitative analysis should be used to identify counterparties for which large moves in specific market risk factors would result in large exposure levels, a material deterioration in credit quality, or both.

4.8.4 For AIs which are active market participants, information provided to senior management should highlight possible concentrations of market and credit risks resulting from positive correlation among an AI's own principal positions, counterparties' positions with the AI and collateral received or posted.

4.8.5 Sufficient contextual information should also be provided to senior management periodically for assessing the degree of reliance that can be placed on quantitative CCR management information, highlighting key judgements and assumptions involved in developing the quantitative CCR management information, and shedding additional light on an AI's overall risk profile. Examples of such information include information relating to data integrity and completeness, model assumptions and limitations, and legal enforceability of credit risk mitigating arrangements.

4.9 Risk mitigating practices

General

4.9.1 AIs should apply appropriate credit risk mitigating measures or credit enhancements to control their exposures to counterparties. The major common credit risk mitigating measures include netting, collateral and margining arrangements.

Netting arrangements

4.9.2 Netting arrangements could reduce an AI's overall CCR exposures by reducing the amount of exposures or the number of payments involved. Where netting is legally

enforceable, an AI will have a single claim or obligation to receive or pay only the net positive mark-to-market values of individual contracts covered in the event that the counterparty to an agreement fails to comply with any obligation under the agreement due to default, insolvency, or bankruptcy, etc.

4.9.3 There are various forms of netting arrangements. The more common types of netting adopted by AIs include payment netting[20], cross-product netting and close-out netting[21]. Netting arrangements are usually embodied in master agreements signed by the counterparties.

Collateral and margining arrangements

4.9.4 As in the case of traditional credits, the posting of collateral or the application of margining requirements will reduce an AI's CCR to its counterparties, provided that the collateral arrangements are legally enforceable in all relevant jurisdictions, and the assessment and valuation of the underlying collateral are prudent and robust.

4.9.5 Subject to the collateral arrangements, either one or both counterparties may be asked to post collateral (such as securities, cash or other assets) against its / their respective obligations under a contract, depending on whose position is out of the money. For counterparties with outsized positions relative to market liquidity in a particular segment, AIs should consider collecting a higher initial margin or impose higher haircuts on the collateral received.

4.9.6 AIs should refer to CR-G-7 "Collateral and Guarantees" and section 7 of CR-S-4 "New Share Subscription and Share Margin Financing" for more guidance on managing collateral received. AIs should also be mindful that, while collateralisation may reduce CCR,

[20] Payment netting aims to reduce all payment obligations due on the same date and in the same currency to a single net payment.

[21] Close-out netting is an arrangement which allows settlement of all contracted but not yet due obligations to and claims on a counterparty by one single payment, immediately upon the occurrence of one of the defined events of default.

this could be at the cost of increasing other risks such as legal risk, operational risk and liquidity risk. Such risks may arise from the documentation and legal enforceability of the arrangements, or concentration or valuation issues relating to the underlying collateral.

Other forms of credit risk mitigation

4.9.7 Other forms of credit risk mitigation may include obtaining guarantees from a third party with stronger financial standing, or incorporating further risk mitigating measures (such as the rights of set-off[22], option-to-terminate[23] and material-change triggers[24] etc.) in the master or bilateral agreements.

4.10 Independent reviews and audits

4.10.1 The Board and senior management should make use of independent reviews and audits to ensure the integrity, accuracy and effectiveness of the CCR management systems. Such reviews and audits can be conducted by an AI's internal auditors or independent external parties (e.g. external auditors) that are qualified to do so, and may also take the form of ad hoc reviews on specified areas.

4.10.2 An independent review of the overall CCR management framework should cover both the activities of the business units (credit and trading) and of the independent CCR control function. Such review should take place regularly (ideally not less than once a year), and should cover, among other things, the following

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[22] In a termination or liquidation, set-off provisions allow obligations to offset each other. Despite the use of master agreements, parties may rely on post close-out set-off rights to net termination amounts attributable to (i) products beyond the scope of those master agreements or (ii) transactions involving non-parties to the master agreements (e.g. affiliates).

[23] An option-to-terminate provision gives either counterparty, after an agreed-upon interval, the option to instruct the other party to cash settle and terminate a transaction based on the transaction's net present value. The existence of the option allows both parties to view the transaction as having a maturity which is effectively reduced to the term of the option.

[24] Material-change triggers convey the right to change the terms of, or to terminate, a contract if a pre-specified credit event occurs such as a rating downgrade, failure to pay or deliver, an adverse change in the counterparty's financial standing, or a merger event. Credit events may trigger the termination of a contract, the imposition of a collateral requirement, or stricter collateral terms.

aspects relating to CCR measurement and valuation where applicable:

- the scope of CCR captured by the risk measurement system;
- the accuracy and appropriateness of CCR measures adopted, and the integration of such CCR measures into daily risk management;
- the validation, review and approval processes for risk pricing models and valuation systems used by front and back office personnel, including any subsequent material changes to those models and systems;
- the accuracy, completeness and integrity of the CCR data and data sources;
- the accuracy and appropriateness of model assumptions and methodologies employed; and
- the verification of the accuracy of any models adopted for CCR measurement through frequent back-testing.[25]

4.10.3 The results of such reviews and audits, including any issues and weaknesses identified, should be promptly and directly reported to the Board and senior management so that they can take early remedial actions, where necessary.

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[25] Where AIs employ more sophisticated models for quantifying CCR exposures in their internal risk management systems, they may draw reference to paras. 43 and 44 of Annex 4 to the Basel II framework for guidance on back-testing of such models.